JPRS-ELS-87-005

16 JANUARY 1987

Europe/Latin America Report

SCIENCE AND TECHNOLOGY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-ELS-87-005

16 JANUARY 1987

EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

WEST EUROPE

EAST EUROPE

ESA AFFIRMS PLANS FOR COLUMBUS-U.S. SPACE STATION LINK

Paris AFP SCIENCES in French 2 Oct 86 pp 16-17

[Unsigned article: "ESA Still Expects To Be Aboard the International Space Station of 1994"]

[Text] Paris--Faced with changes in NASA's space station concept, officials of the European Space Agency (ESA), during the Columbus program council meeting in the past two days, have reaffirmed their desire to see the European manned module attached to the station in 1994 as planned, or with only a few months' delay.

"The decisions are not needed immediately. We understand that the Americans must take into account the reports which they recently received, and which James Fletcher, NASA general administrator, disclosed to the congress on 25 September. But we do point out, and will continue to do so, that we fully expect Europe to be present as such aboard the station on the scheduled date, or with a minimum delay," indicated an official of the Columbus program to AFP on 26 September.

"There is no hurry; political decisions are not expected before mid-1987, and before the end of next year an inter-governmental agreement will first have to be reached between the United States and NASA on one side, and Europe on the other, followed by the famous ESA-NASA technical memorandum of understanding," the same source added on 26 September.

Meeting for the past two days at the ESA headquarters in Paris, the Columbus program council has taken no weighty decision, except for the one to limit to 2 tons instead of 2.4-5 tons the payload of the polar platform, one of the four elements composing the European portion of the 1995 international space station built under NASA supervision, in which Japan and Canada are also participating.

While waiting to know exactly what space station concept will be selected by NASA, and to learn its orbit installation calendar, the council has concluded that the technical preparation of the four elements will have to be continued.

In addition to the polar platform, this program includes: the manned laboratory module, an autonomous laboratory platform capable of being supplied and maintained by astronauts, and a small, fully automatic scientific platform flying together with and in the same orbit as the station.

Maintenance and connection problems that will arise with the polar platform have led to limitations in its payload. In the currently selected concept, this platform would become the largest earth observation satellite ever placed in orbit, an instrument with many spinoffs for exploiting earth resources. For installing new film magazines in its cameras, and to repair and maintain the latter, the only vehicle that appears suitable to specialists in the European agency is the Hermes space plane.

This is one way, from a technical standpoint, for the plane to gain recognition from Europe's politicians and financiers, who have not yet officially and definitely included it into the agency's programs, but where its place is becoming increasingly clear for earth-station and station-platform transportation, along with the American shuttles. It is also a way to bring it to NASA's attention.

On 25 and 26 September, the Columbus program council also provided an opportunity to assess ESA-NASA relations, as well as to learn the technical wishes and requirements of the industrialists which will use the instruments in the manned laboratory module. A special department was created, intended to serve as liaison between industrialists and technicians, between Europe and the United States, and which will be the only intermediary between industry and those responsible for the operation of the laboratory in orbit. "We want to avoid thereby the difficulties encountered with Spacelab," ESA points out.

On the strength of its options and its desire to see its space program fully implemented, Europe steadily continues on its path, aware of the constraints inherent in its participation in the NASA station, but fully determined to defend its viewpoint.

11,023
CSO: 3698/139

BRIEFS

UK-USSR SPACE ACCORD--Moscow--USSR and Great Britain have reached a technological space cooperation agreement, covering the 1987 orbiting of a British probe equipped with an X-ray telescope. The agreement protocol announced on 2 October by TASS, was reached the evening before after a meeting in Moscow between delegations of the Soviet Institute for Space Research (IKI), led by Roald Sagdeev, and of the British National Space Center (BNSC), led by its director general, Roy Gibson. Mr Sagdeev stated that "perspectives for cooperation in space exploration between Soviet and British specialists are good, particularly in astrophysics, radioastronomy, and space materials." The Roentgen project designed by IKI and the British center will be the first large space cooperation undertaking between USSR and Great Britain; the Netherlands and FRG will also be associated in it. A Soviet probe will be placed in orbit next year, carrying aboard an infrared telescope developed by researchers at the University of Birmingham. Mr Gibson declared himself satisfied by the results of this Moscow meeting, which he said, made it possible to define cooperation areas of mutual interest. The Soviet-British meeting, announced by the British Ministry of Commerce and Industry, started on 29 September and lasted four days. Mr Gibson was accompanied by professors Peter Willmore, from the space division of the University of Birmingham, Valerie Bowell, from BNSC, and Dr John Harries, from the Rutheford Appleton Laboratory, who made proposals for experiments in X-ray astronomy, in the behavior of materials in microgravity, and in fundamental physics research. The possibility of a Soviet proposal to fly a British astronaut aboard a Soviet space ship, informally advanced to Mr Pattie during the recent visit of a group of British members of parliament in Moscow, is not mentioned in the TASS communique. The first British astronaut would have normally flown this year aboard an American shuttle, had the Challenger disaster not occurred. [Unsigned article] [Text] [Paris AFP SCIENCES in French 2 Oct 86 pp 18-19] 11,023

CSO: 3698/139

VOLVO CHIEF ATTACKS JAPANESE CAR MANUFACTURERS' TACTICS IN SWEDEN

Gyllenhammar Speaks Out

Stockholm SVENSKA DAGBLADET in Swedish 21 Nov pp 2, 3/I

[Article by Carl Swartz: "Japanese Irritate Gyllenhammar"]

[Text] [SVENSKA DAGBLADET introduction] The Volvo chief, P.G. Gyllenhammar, made a surprise move last Thursday when Volvo published its nine-month report.

He was extremely irritated by the Japanese car manufacturers' coordinated attack on the Swedish automobile market.

"One should be able to require a certain self-discipline on the part of the Japanese auto makers," said P.G. Gyllenhammar and pointed to the fact that the Japanese share of the Swedish market has increased from 15 to 20 percent in one year.

He did not, however, want to go into detail about how the Japanese manufacturers had achieved their success in Sweden. He could not accuse them of price dumping.

Volvo's earnings during the first three quarters were over six billion kronor. Volvo did not do as well, however, during the third quarter as it did during the first six months.

"One should be able to require a certain self-discipline on the part of the Japanese auto makers," said the Volvo chief, P.G. Gyllenhammar, when Volvo published its nine-month report last Thursday.

Behind well-chosen words, his strong irritation over the Japanese auto makers' actions in the Swedish market could be discerned.

"Of course the Japanese make good cars, but that cannot explain why their market share in Sweden increased from 15 to over 20 percent in one year," explained Gyllenhammar. "Their cars have not become that much better."

On the other hand, he did not want to enter more closely into how the Japanese auto makers had become so successful in Sweden. He could not accuse them of price dumping.

"The Japanese manufacturers do not act individually, they act as a group, as a nation and not as competitors among themselves in the market place. In their own interest, they ought to be more careful," he warned.

Clear Message

He explained that his words were not meant as a warning or a threat.

"We'd be poor industrialists if we didn't watch the market statistics very closely. And it's not difficult to notice that the Japanese have increased their share of the Swedish market considerably."

His message to the Japanese auto makers was still fairly clear. If they continue their unrestrained offensive, demands for countermeasures will be unavoidable.

He pointed out that one European country after another has introduced restrictions on the import of Japanese cars. Among the auto manufacturing countries, Sweden is actually the only one that supports the principle of free trade.

"We are the only allies the Japanese have when it comes to supporting free trade, In such a situation they ought to be careful, they should treasure their friends. It is conceivable that a lack of self-discipline on the part of the Japanese might lead to Sweden being forced into some form of protective measure."

Profits Reduced in Third Quarter

Stockholm SVENSKA DAGBLADET in Swedish 21 Nov 86 p 3

[Article by Christer Hedberg]

[Text] The Volvo concern is headed for yet another good year. Profits during the first three quarters of this year were more than six billion kronor, but at the same time, the nine-month report shows that Volvo did not do as well during the third quarter.

That is why the Volvo chief, P.G. Gyllenhammar, was questioned closely during the press conference in Stockholm on Thursday. The question is whether the decrease in the third quarter now heralds a break in the trend and whether Volvo's earnings have reached their peak.

"It shows that things are somewhat worse, but we are still doing well," said P.G. Gyllenhammar.

Altogether, the nine-month report shows that the sinking dollar value is causing the earnings from Volvo's American subsidiaries, when translated into kronor, to reduce the earnings of the company by 200 million kronor. A comparison with the third quarter of 1985 shows that the net return was reduced to 1,323 million kronor (1,597), a decrease of 17 percent, while invoicing was reduced by six percent to 18.8 billion kronor.

P.G. Gyllenhammar did not want to go into detail about what Volvo is doing to guard itself against the fall of the dollar.

He also said that during 1986 Volvo earned more money in the United States in dollars than in 1985 and that the production of passenger cars, as well as trucks, has reached capacity limits.

The earnings during the first three quarters, 6,701 million kronor, yielded a return on invested capital of 18.6 percent (20.3) during the last twelve-month period. A decrease which was explained by Gyllenhammar by high liquidity and acquisitions which, so far, have not yielded enough interest.

"But the net margin, 9.9 percent, is the highest ever," said the Volvo chief.

Invoicing decreased somewhat to 60,978 million kronor. The decrease is entirely due to the oil trade which decreased by 39 percent. Exclusive of the oil trade and the newly acquired food companies, the increase in sales amounted to six percent. Apart from the oil trade, 82 percent of the total invoicing or 42,950 million kronor (39,384) occurred in markets outside of Sweden.

Million kronor	January-September 1986	1985	Change percent
Sales	60,978	62,339	-2
Return after deprec.	5,142	5,161	-
Ditto on % of sales	8.4	8.3	
Net return	6,071	5,855	+4
Ditto in % of sales	9.9	9.4	
Yield/share	38.00	34.90	+9
Net return on invested capital the last twelve months	18.6	20.3	

12339
CSO:3698/133

WORLD CONGRESS ON HEMOPHILIA HELD IN MILAN

Milan BIOTEC in Italian Apr 86 p 58

[Article by Fabio Terragni]

[The explanation of the molecular mechanisms and the possibilities of diagnosis in hereditary diseases made tremendous progress in recent years. This is certainly the sector of medicine which has benefitted most from the introduction of recombinant DNA techniques.

An expression of this fact comes from the 17th International Congress of the World Hemophilia Federation, held in Milan between 8 and 13 June under the title "Progress in Hemophilia through Biotechnology," which was attended by almost 700 scientists from 40 countries under the chairmanship of Pier Mannuccio Mannuci.

There was bound to be a part connected to the number one enemy of anyone who must subject himself to continuous blood transfusions: the HTLV III/LAV virus, associated with AIDS. There was talk of the most recent methods used to discover anti-HTLV III antibodies in the blood as well as the risks connected to transfusion therapy for hemophilic patients. But attention was concentrated on DNA probes for the prenatal diagnosis of hemophilia and for the identification of carriers who are not affected. This symposium, sponsored by the Finalized Project of the CNR [National Research Council] entitled "Genetic Engineering and the Molecular Foundations of Hereditary Diseases," saw the presentation of the results of the initial diagnostic studies conducted with the use of molecular probes to discover polymorphisms and other gentic indicators within the genes as regards the Factor VIII (hemophilia A) and Factor IX (hemophilia B). All of the researchers who spoke out agreed that prenatal diagnosis of hemophilia is now a fact but it is not yet able to come up with a reliable answer for all families that are at risk and it must therefore be improved.

As regards the molecular foundations of hemophilia, whose understanding is absolutely necessary to arrive at a generalizable diagnosis, a picture is now emerging that is very similar to the picture known in the case of thalassemias and molecular defects of hemoglobin synthesis. In this case, the mechanisms that threaten the correct expression of the genes for the factors of coagulation can be deletions (absence of fragments of DNA containing the information for protein) and mutations of various kinds (responsible for the formation of termination tail pieces or changes in direction, if located in

structural regions, or simply defects of expression, if they are found in the regulation sequences of the gene).

The symposium devoted to the production of coagulation factors via genetic engineering, sponsored by the Maggiore Hospital in Milan, was attended by foreign scientists coming both from public research centers and from biotechnological companies.

The first success in cloning and therefore in the production of a coagulation factor (Factor VIII) goes back to the end of 1984 and should be credited to Genentech. Today it is possible also to produce the biologically active Factor IX by using particular lines of cells of mammals as hosts. There are also major problems regarding the industrial-scale production of these proteins but these are advantageous products because they are safe and they are certainly free of contamination by infectious viruses.

A short practical course to teach the technologies of DNA applied to hemophilia was also given during the Congress.

5058
CSO: 3698/96

ITALIAN GROUP ORGANIZED TO POOL MEDICAL SKILLS

Milan BIOTEC in Italian Apr 86 p 56

[Text] The first molecular genetics coordinating group has been established in Italy. The purpose is to create an archive of skills available in Italy in the field of molecular biology which can be used for the diagnosis and prevention of hereditary diseases. In particular, the initiative is aimed at optimizing the knowledge and material available for prenatal diagnosis with an analysis of the DNA through hybridation with probes. There are now various Italian groups that have used these techniques at the research and clinical levels. An important aspect of the summary of knowledge developed so far will be the 7th Congress on Human Genetics: New Molecular Approaches and Techniques for the Study of Hereditary Diseases, which will be held in Genoa, at the Gaslini Institute, from 18 to 19 September (see the column entitled "Scheduled Meetings"). The initiative, pursued by professors Paolo Durand and Giovanni Romeo as of now includes eight fields of interest, each of which is headed by a coordinator:

Mapping of the human genome: M. Rocchi, Genoa;

Coagulation defects: A. Fantoni, Rome;

Hyperlipidemia: S. Calandra, Modena;

Collagenopathy: R. Cancedda, Genoa;

Thalassemia and hemoglobinopathies: C. Camaschella, Turin;

Muscular dystrophies and cystic fibrosis: G. Romeo, Genoa;

Follow-up of prenatal diagnosis: B. Brambati, Milan;

Phenylketonuria and other metabolic diseases: G. Andria, Catanzaro.

5058
CSO: 3698/96

POSSIBLE AGREEMENTS BETWEEN ITALY, GREAT BRITAIN

Milan BIOTEC in Italian Apr 86 p 56

[Text] The scientific office of the Italian Embassy in Great Britain organized a round-table discussion in London on biomedical research among representatives from public and private research in this sector of both countries. The purpose was to offer the participants the possibility of getting a better knowledge of the respective areas of interest and activity for possible future collaboration programs. The situation in this field, both in Italy and in Great Britain, was illustrated for Italy by Falaschi and Garattini and for Great Britain by Fairtlough and Rees; the picture did not turn out particularly brilliant, above all when compared to American and Japanese competition.

It is however a situation that reflects the general European situation which finds that its research efforts are in many sectors excessively broken up, just as the markets look broken up. To win a bigger market, it is now considered necessary to work in collaboration not only in the field of precompetitive research but also in the area of competitive research. G. Potter, who is in charge of biotechnology at the Science and Engineering Research Council, and Rossi Bernardi, chairman of the CNR [National Research Council], laid the foundations for the continuation of this initial bilateral gathering. Potter will come to Italy shortly to visit the centers that are interested in collaboration with the United Kingdom.

5058
CSO: 3698/96

EEC'S 1982-86 BIOTECHNOLOGY PROGRAMS

Milan BIOTEC in Italian Apr 86 pp 53-55

[Article: "Genetic Engineering on Microorganisms of Significance to the Agribusiness Industry" (Final meeting held in Cork, 9-12 April 1986). First two paragraphs are BIOTEC summary heading.

[Text] The BEP (Biomolecular Engineering Program), launched by the European Community for the period of 1982-1986, has reached its final phase. The various sectors into which the BEP was subdivided have now been combined for an overall review of the scientific results that were achieved. In No 3 of BIOTEC, Etienne Magnien summarized the results of activities involved in species that are of interest to agriculture.

Following are brief summaries of the final meetings held by the three sectors of the BEP: genetic engineering on microorganisms that are of significance to the agribusiness industry; genetic engineering on virile and cellular genes that are important to breeding; second generation of bioreactors.

Agribusiness industry: in the course of 1985, cloning vectors capable of replicating themselves and being expressed both in Excherichia coli (gram-negative) and in Bacillus subtilis (gram-positive) and in Streptococcus lactis, were perfected. As regards this last lactic bacterium, its transformation efficiency was increased 1,600-fold; two genes were isolated for proteinase; their molecular genetics were studied and numerous sequences of DNA, which are fundamental for gene expression, were identified; strains resistant to phages were isolated and some plasmids, responsible for this resistance, were characterized.

The molecular genetics and the possibilities of transformation were studied also for yeasts of the Kluyveromyces genes, capable of fermenting lactose. To be able to construct strains that would secrete aminoacids, transmembrane (permease) transport systems of S. cerevisiae were examined. In particular, the genes of proline permease and the aminoacidic permease-regulating genes that are sensitive to ammonium were identified and cloned.

The gene for alpha-amylase of B. stearothermophilus was cloned into Staphylococcus carnosus, a gram-positive bacterium which is used for the industrial fermentation of cork in Germany. The purpose was to make S. carnosus capable of hydrolyzing the granules of glycogen that are present in the meat; but the

cloned gene turned out to be unstable and stabilization systems are therefore now being studied.

Upgrading of biomass: the purpose was to identify strategies that would be useful in the fermentation of cellulose (about 50 percent of the biomass), of hemicellulose (about 25 percent), of lignin (about 20 percent), and of other lesser components, such as the pectins and amide.

Cellulose: numerous genes of the pathogenic bacterium Erwinia chrysantemi were isolated and characterized and they code for enzymes which are active in the digestion of the cell wall. These genes can easily be transferred into E. coli.

Interest was also concentrated on the gram-negative bacterium Zymomonas mobilis which ferments glucose and fructose along with the high-yield production of ethanol, for the purpose of extending this characteristic of it also to the fermentation of cellulose. Two plasmids of Zymomonas were isolated and were used for building a recombinant vector with which it is possible to transform E. coli.

Another source of genese for the fermentation of cellulose is the bacterium of the rumen Bacteriodes succinogenes: from a genotheque with lambda phage, fragements were isolated that code for carboxymethylcellulose and for galactomannase.

To study the genes responsible for the production of butanol in Clostridium acetobutylicum (for the purpose of cloning them into a species capable of growing on cellulose), defective mutants were isolated in butanol dehydrogenase and in butyraldehyde dehydrogenase, which will be used as hosts for cloning. Noteworthy progress was made in the transformation of bacteria of the genus Clostridia was achieved by using protoplasts and regeneration systems.

Hemicellulose: only partial success was achieved in the attempt to construct strains of yeast capable of using pentoses. A bacterial gene for xylose isomerase was cloned into yeasts that use xylulose (a product from xylose isomerase). The assimilation of xylulose was slightly improved through mutagenesis but the growth speed remains slow (6 hours as against 2 hours for glucose).

Lignin: the attractive assumption of using this aromatic polymer which is extremely inert and abundant, has led to the study of two bacterial species capable of degrading lignin: Pseudomonas and Klebsiella planticola. Thanks to a new system of cloning, a gene was isolated from the degrading path of lignin in Pseudomonas. In Klebsiella, the isolation of mutants, blocked at various levels of the degrading path, made it possible to establish the existence of two different catabolic paths.

Pectins and amide: through the method of protoplast fusion, an attempt was made to transfer, from yeasts of the genus Lipomyces to those of the genus Saccharomyces, the capacity of growing on amide and, from Candida

macedoniensis to Saccharomyces, the pectinasic activity. The result achieved however is not considered to be satisfactory.

Genetic Engineering on Viral and Cellular Genes of Significance to Breeding (final meeting held at Cambridge, 2-5 April 1986)

Viral genes: in this sector, most of the work was concentrated on the identification, characterization, and cloning of coding genes for proteins that are responsible for the immunity response against the virus. The purpose naturally was to produce recombinant vaccines, or proteins capable of triggering an effective antibody response, or monoclonal antibodies against particular epitopes for the purpose of neutralizing the virus.

In particular, six epitopes were identified in TGEV (Transmissible Gastroenteritis Virus) of the pig; they were cloned and expressed in Excherichia coli and, finally, they were used to obtain monoclonal antibodies. In a virus neutralization test, two of these epitopes proved to be particularly efficient.

A recombinant vaccine, containing the principal glycoprotein of IBV (Infectious Bronchitis Virus), a pathogen of chickens, was built and studied through synthesis in CV-1 infected cells. The immunogenic effectiveness must also be examined.

Particular attention was devoted to FMDV (Foot and Mouth Disease Virus) which was the subject of research intended to discover the basis, at the molecular level, of the enormous antigenic variability presented by that virus and the mechanisms of recombination on the RNA molecule. In this case likewise, the ultimate purpose was to make a vaccine; cloned in E. Coli were proteins (VP1) which contain antigenic determinants that are capable of bringing about the formation of neutralizing antibodies against the virus. VP1, the main agent responsible for immunogenicity, was produced, although only with low efficiency, in coli but its effectiveness remains yet to be demonstrated.

As for the bovine and swine Rotavirus, the phase of isolation and characterization of the glycoproteins present on the external surface of the virus was reached. In the first case (bovine), there are still cloning difficulties, whereas in the second case (swine), the protein was produced in E. coli as a fusion protein (with beta-galactosidase) and, after some special procedures, it proved to be capable of stimulating the production of neutralizing antibodies when used to immunize small animals.

PRV (Pseudorabies Virus) was also the subject of studies of this kind but it was possible only to draw the map of the structural genes of this virus and work is still in progress on the cloning.

A different route was chosen in the case of BLV (Bovine Leukemia Virus) in which it was possible to identify three epitopes located on gp51 glycoprotein, directly involved in the infectious properties of the virus. In this case, instead of cloning the genes, synthetic peptides were produced and they were then used in perfecting the monoclonal antibodies.

The study of the Baculoviruses, which are the pathogens of insects with a very restricted host spectrum, was aimed at the isolation of recombinant strains that would be capable of growing in a culture while retaining their specific nature, so as to be able to be used as natural pesticides. Finally, retroviral vectors were perfected for genic transplant into chickens derived from AEV (Avian Erythroblastosis Virus) after substitution of the viral oncogens. A cellular helper line was also established for the production of recombinant virions, without the release of infectious virus helpers.

Cellular genes: in this case, likewise, basic research and studies, more directly connected with practical applications, were conducted. The structure of the protein ROP (Repressor of Primer) of E. coli was observed and the EF-1 alpha (Elongation Factor), again of coli, was cloned and sequenced. Another characterization study was completed on the sequences that promote the gene of bovine thyroglobulin, a pro-hormone which is the precursor of two thyroidal hormones.

Research on two toxins was definitely oriented more toward production: the enterotoxin Staphylococcus aureus and the diphtheria toxin. The former constitutes a threat to food poisioning, which is why monoclonal antibodies were produced which are capable of selectively linking up to the enterotoxin S. aureus, to be used in a diagnostic ELISA kit. As regards diphtheria toxin, the expression in coli of a fusion protein, which however is immunogenically reactive, was achieved.

A system for the microinjection of a fertilized egg was developed with a view to the production of beef cattle and poultry with better growth characteristics. For the time being, microhandling was conducted on the fertilized egg of salmon and mice, using genes connected to the inducible promoter of metallothioneine.

The project of isolating and characterizing genes for equine gonadotropins--FSH (Follicle Stimulating Hormone), LH (Luteinizing Hormone) and CG (Chorionic Gonadotrophin)--used as fertility stimulators also in nonequine species, for the time being only led to the cloning of the alpha subunit of CG. A special chapter consists of the proteins of milk which were studied for the purpose of improving the food properties of milk and for their possible production in systems and fabrics different from natural ones. Finally, it was possible to isolate and sequence α-lactalbumin, α_{s1}, α_{s2}, β and K. casein and β-lactoglobulin. Also studied was hormonal control in rabbits and, for the genes of α_{s1} and β casein and WAP (Whey Acidic Protein), a definite dependence was found on the stimulation by prolactin, whose action can be further increased by insulin and cortisol; this study also shows that the expression of these genes is under the control of glucocorticoids and not mineral-corticoids. (By Fabio Terragni)

Second Generation of Bioreactors

The results of the final meeting in this sector of BEP (Compiegne, 6-9 April 1986) can be subdivided into four sections:

A. Immobilization of enzymes and cells
B. Recycling of enzymatic cofactors
C. Industrial applications
D. Bioreactor models

A. The possibility of using the inclusion of the acid phosphatase in hydrogels to prevent its denaturing or inactivation was evidenced. Under optimum immobilization conditions, a variable temperature range from 30° C to 50° C, the inactivation of the immobilized enzyme follows a first-order kinetic pattern and, during the first 200-300 hours, enzyme activity reaches an asymptotic residual activity value of 20-30 percent.

A method of enzyme immobilization through a graft-copolymerization, initiated photochemically, was also presented. Three different model systems were considered in which--while keeping the type of enzyme constant (horseradish peroxidase, HRP) and the trifunctional vinylic monomer (hexhydro 1, 3, 5 triacryloil-s-triazine HTsT)--there was a variation in the type of support (Sepharose or agrarose) and the reaction temperature (20 or 35° C). Using Sepharose as a support at a temperature of 35° C, one can obtain optimum immobilization conditions with good heat stabilization (after 240' at 60° C: 70 percent residual activity) as compared to the free enzyme (after 240' at 60° C: 30 percent residual activity) and a K'_m value which is very close to that of the native enzyme.

Regarding the immobilization of the cells, interesting parameters were determined, such as the surface energy of the microorganisms and their influence on immobilization through adhesion. Both hydrophobic (Moniliella pollinis) and hydrophile (Saccharomyces cerevisiae and Acetobacter aceti) organisms were studied.

Still in the context of studies aimed at the immobilization of cells, it was demonstrated that, in the case of Gluconobacter oxydans, it is possible to adapt the immobilized cells to high concentrations of substrate in a more efficient manner when compared to the use of free cells under chemiostatic conditions.

The use of diacetylenic phospholipids was also proposed for the synthesis of membranes with a double layer, very similar to the natural ones, consisting of phosphatyldicholine, extremely suitable for the immobilization of enzymes and cells.

B. In the context of these research projects, numerous systems were studied and perfected for the recycling of cofactors (NAD(H), NADP(H), FAD(H)) associated with important enzymatic reactions, such as the oxide reduction of the biliary acids (whose derivitives are used in the pharmaceutical industry) through immobilized hydroxysteroid dehydrogenase. The NAD is regenerated in situ, using α-ketoglutarate/glutamate dehydrogenase (to regenerate NAD and NADP), formiate/formiate dehydrogenase (NADH) or glucose/glucose dehydrogenase (NADH and NADPH). In the oxidation of the colic acids one can achieve complete transformation (200 mg of initial sterioids) in 3 days and the turnover number for NADP is 470.

Also studied was anaerobic reoxidation in the organic phase of FAD of cholesterol oxidase through a series of artificial acceptors, which are highly hydrophobic, of electrons (nickel phthalocyanin; 9, 10-phenanthrene quinone in butyl acetate and toluene). The better reoxidation of the enzyme, using these particular acceptors, leads to an activity increase of 30 percent as compared to figures obtained from the natural final acceptor (O_2).

Good results were achieved also in the enzymatic synthesis of L-aminoacids from hydroxylated analogs (for example, in the production of L-leucin from D,L-hydroxyisocaprate via 2-ketoisocaprate) always via the enzymatic route with recycling of the FAD cofactor.

C. In the field of practical application, in addition to the information given above, good results were achieved, such as the synthesis of long-chain aldehydes (used as aromatizing substances) through immobilized alcohol dehydrogenase of horse liver (HLADH) and using a two-phase system (water--organic solvent).

In general, numerous model systems were studied and prepared for the production--via enzyme reactor--of phosphorylated sugars, mannitol, and gluconic acid.

The potential of some enzymes (β -galactosidase, DNA polymerase), extracted from thermophile microorganisms (Sulfolobus solfataricus) were emphasized; they are therefore extremely stable at high temperatures and are suitable for industrial applications. Finally, a method of co-immobilization of cells of Saccharomyces cerevisiae with β -galactosidase was evidenced for the continuous production of ethanol from lactose.

D. As regards the study of models of bioreactors, a new type of loop reactor (LR) was presented; it is particularly suited for biosystems with high viscosity or high concentration of gaseous substances. This reactor furthermore presents the advantage of low initial and maintenance costs.

Finally, new reactors with membrane in the liquid phase were presented; they make it possible completely to eliminate diffusional barrier problems for the substrates and the products of enzymatic reaction. (By Luigi D'Angiuro and Stefania Galliani)

5058
CSO: 3698/96

INDUSTRY, UNIVERSITIES MEET IN ITALY ON PROTEIN BIOCHEMISTRY

Milan BIOTEC in Italian Apr 86 p 57

[Article by Bruno Curti]

[Text] The symposium entitled "New Prospects for Research in the Biochemistry of Proteins," organized by the General Physiology and Biochemistry Department of the University of Milan and by the "Structure and Function of Proteins" Group of the Italian Biochemistry Society, was held at Villa Feltrinelli in Gargnano del Garda between 10 and 12 April. It was the intention of the organizers to arrange an initial meeting between researchers from industry and those from the universities and the CNR [National Research Council] on the topic of research in the field of proteins. The "biotechnological" era as a matter of fact, in the opinion of many people, represents a moment of happy symbiosis between industrial research and pure research, between "protein engineering" and molecular biology. In this context, Rappuoli (Scavo), Grandi (ENI [National Hydrocarbons Agency] Research), Galante (Recordati), Soria (Farmitalia) and Corti (Lepetit) illustrated the industrial aspects of research on proteins; the university researchers and those at the CNR--with the help of the foreign colleagues present--on the other hand concentrated their attention on structural and spectroscopic methods for the study of proteic molecules, on proteic engineering, and on post-transfer modifications. Various motives for reflections sprang from this; the first one is that the "biotechnology" of a protein is intimately tied to the knowledge of its chemical-physical properties and its primary structure. In this field, fortunately, it is possible today to undertake research with new methodologies, both from the viewpoint of structural analysis (Bossa, Ramponi, Marino) and from the spectroscopic aspect (Edmonson, Rossi, Neri, Finazzi-Agro, Pagani). In the structural field, John Walker furthermore underscored the close complementality existing between methods of aminoacidic sequence of a protein and those based on the nucleotidic sequence. In this context, again, the symposium also offered new approaches to the study of the active center of a protein, through the use of similar co-enzymes, functioning as true and proper molecular "probes" (Massey and Ghisla). A second motive for reflection is represented by the enormous potential inherent in techniques of "site-directed mutagenesis" for the study of a protein (Robin Leatherbarrow), however when we already know the primary structure and the three-dimensional structure of the latter. Protein engineering, which is so important because of its industrial spinoff, so far seems to call for close collaboration between molecular biologists, protein chemists, and crystallographers. The contribution from the latter and

from high-resolution cyrstallography, in particular, was illustrated by Georg Schulz, with his images of adenylate-kinase, and by Martino Bolognesi, who prepared a summary of the potential and prospects offered by computer graphics in the construction of molecular models and in the study of protein-ligand interactions.

A third reason for reflection is provided by the now widespread awareness of the tremendous contribution offered by molecular genetics and by immunology to the study of proteins; in this sense, the symposium furnished many examples, both from the above-mentioned researchers in industry, and from those coming from the university sector (Sannia, Arosio). A portion of the work of the symposium was set aside for the post-transfer modifications of proteins (Pinna, Giannotti, Tortora, Faraone-Mennella, Servillo, Vidali and Ciardiello) to a posters' discussion, coordinated by Curti and D'Alessio. Beyond mere statistical facts, what indeed is the image of Italian research on proteins which Gargnano offered the observer? There is undoubtedly noteworthy enthusiasm and a wide-open approach--on the part of various research groups--toward the new methodologies and the new prospects offered by protein engineering; industry, on the other hand, appears to have gotten the message with all of the potential inherent in it. Industry and the universities are beginning also to understand the usefulness of cooperation on new basis; in this sense, one of the purposes of the "Structure and Function of Proteins" Group of the SIB [Italian Biochemistry Society] in organizing this symposium was fully attained.

The symposium also however brought out some negative aspects. The number of young college graduates who are employed in this research sector is still too small. In addition to the shortage of young researchers, there is the perhaps excessive fragmentation of research interests and directions; the result is the lack of a "critical mass" of researchers (sometimes made even worse by the absence of connections between individuals), which is so necessary for a qualitative and not just quantitative advance in Italian research in the field of proteins.

5058
CSO: 3698/96

MEETING ON IMMUNOLOGY IN CORTONA

Milan BIOTEC in Italian Apr 86 pp 57-58

[Article by Rosaria Orlandi]

[Text] The 14th National Convention of the Immunology Cooperation Group was held at Cortona between 5 and 7 June. One of the most heavily debated topics of the convention was the study of action and activation mechanisms of the lympho-monocytary cells. In particular, the distinction was underscored between "conventional" cytolysis and the various other ways of activating cytolytic cells which are grouped under the definition of "unconventional" cytolysis. The term "conventional" is referred to lysis in which direct contact between the effector and the target is handled through the receptor of the T cells and where MHC is restricted. This way--connected to a strictly specific recognition--involves only a very tiny percentage of cells with a cytotoxic potential, thus limiting the practical application possibilities in the field of therapy unless there is a major expansion of specific clones. The recruitment of a larger population is possible by following the ways of "unconventional" activation, that is to say, by stimulating the effector cells with allogenic lymphocytes, lectins, and interleukin 2 (IL-2). The activated populations thus obtained are now in the process of characterization for a definition of the immunological profile and an identification of the precursors. A particularly effective "unconventional" way of activation is the method in which contact between the effector and the target is provided by antibodies directed against membrane structures of the two cells, for example, heteroaggregates or hybrid antibodies directed simultaneously against the T3 antigen and against tumor-associated antigens. The understanding of these "unconventional" activation routes can either definitely clear up the effector mechanisms of the immunity system or can lead to a rapid application in the clinical field that would be of major biotechnological interest. As a matter of fact, only the availability of recombinant lymphoquines--IL-2, gamma-interferon--furnished these substances in quantities sufficient to enable us to look forward to therapeutic use. Besides, the recombinant material gave immunological research an extremely effective instrument with which to conduct basic studies on the activity of the individual lymphoquines in the role as mediators of the immunity system.

Next there was talk of monoclonal antibodies. The characterization of tumor-associated molecules through the monoclonal antibodies, produced so far, revealed a preferential recognition of saccharidic epitopes expressed by poly-glycosate macromolecules. The presence, on one and the same macromolecule, of

determinants recognized as monoclonal products in various laboratories is possible. This phenomenon could be explained through higher immunogenicity, in the murine system, of such molecules with respect to other cellular structures. Data have been reported according to which a new immunization strategy, with selection of the immunogen and modification of the "traditional" immunization card, led to the production of monoclonal antibodies with a very restricted specificity, capable of recognizing molecules different from those previously described. The problem of the heterogeneity of the antigenic expression of tumor cells was also tackled; it can be solved both in the diagnostic and in the therapeutic field with mixtures of monoclonal antibodies directed at independent antigens. The convention then devoted one session to the analysis of mechanisms for the recognition of the antigen on the part of the T lymphocytes and the antibodies. In the field of molecular biology, applied to immunology, there was a presentation and discussion of data on polymorphism and on the organization of the genetic systems of the receptor of the T cells and of the immunoglobulins. Their gene rearrangement was studied in lymphomas and in leukemias. At the end of the convention, the highly interesting lecture by A. Lanzavecchia of the Basel Institute for Immunology on the status of "activation" of the T lymphocytes presented the topic which certainly was the most intensely discussed at the conference this year.

5058
CSO: 3698/96

SWEDISH INVENTION STOPS COMPUTER HACKERS

Stockholm NY TEKNIK in Swedish 6 Nov 86 p 10

[Article by Ingbert Johansson: "The Box to Stop All Hackers"]

[Text] Goteborg--Here is the weapon that will stop all hackers, people who, by means of telecommunications systems, sneak into various computer systems and steal secret information.

The weapon is an insignificant gray box manufactured by a company in Goteborg. When the hacker calls up and tries to enter the computer system, he or she first reaches the box. If the person is unauthorized, the system is shut down, the entry is registered and the telephone number of the unauthorized person is revealed.

The name of the box that will stop all hackers is Cecure--Secure Callback Equipment--and it was developed by two computer engineers at the Chalmers Technical Institute in Goteborg, Yngve Karlsson and Hans Lindstrom.

The whole thing actually got started when the school switchboard did not function properly after the operator left for the day. Despite night-switching it was impossible to call any of the institutes.

"We then built a separate addition to the switchboard," says Yngve Karlsson. A person could dial a certain number which was then switched to a local number within the school area. Simple but fully functional.

Stop the Hacker

Fortified by their success, Yngve and Hans planned other inventions. But this time they entered the computer field. The goal was, once and for all, to stop all hackers effectively. And after over a year of intensive thinking and research, both of them considered that the goal was reached. The Cecure box was ready to start operation.

"Cecure is based on the callback principle," says Yngve Karlsson. "When a person wants access to the computer system, he calls in on his own telephone. The box has its own memory and can keep track of 500 different telephone numbers. The one who is calling hears a beep, dials his own number and hangs up.

If everything is satisfactory and the number exists in the memory, the box calls back within 20 seconds and the way is open into the computer system," says Yngve Karlsson.

Impossible to Fool

It is impossible to fool the box. If the telephone number is not stored in the memory, it is impossible to get through. The telephone number, however, is noted and can be read, the hacker reveals himself.

The Cecure box consists of three different parts: a computer for memory and tables, a line card for 16 incoming lines and some blank line cards. The body is made of aluminum and built like a rack, easy to remove and rebuild.

"We are convinced that we have found the solution for stopping a hacker effectively," says Yngve Karlsson. "Most of the time it is young boys who are breaking codes for fun. They are not trying to cause any damage. All the same, they can cause a terrible mess, erased files and messed-up programs, a nightmare for the security chief."

The basic model of the Cecure box costs 40,000 kronor today, but mass production should lower the price considerably. The box has recently been approved by the Swedish National Telecommunicaitons Administration.

"They have shown great interest in the box, since it can also stop telephone harassment," says Yngve Karlsson.

Table Model

That is why the two computer engineers have started production of a table model of the safety box. When someone calls, the mini-model answers, sorts out the unwelcome calls but lets old mom through. A welcome addition for everyone who has been plagued by telephone harassment. Now they don't have to unplug the telephone when they want to be left in peace, the box takes care of everything.

Today Chalmers is but a memory. Yngve Karlsson and Hans Lindstrom are fully occupied with demonstrating and selling their Cecure box.

"We started with a small run of six boxes. They disappeared immediately. Now we are running a new series of 20 boxes. Most of them will go to Norway. We hear from customers from almost all over the world. The whole day is spent on the telephone, talking about all the advantages of the box," says Yngve Karlsson.

12339
CSO:3698/133

RIBER OF FRANCE SHOWS LATEST MOLECULAR BEAM EPITAXY DEVICES

Paris ELECTRONIQUE ACTUALITES in French 19 Sep 86 p 20

[Article by S. Dumontet: "Riber Open House Shows Latest MBE Developments"]

[Text] On 12 September, Riber, a division of Instruments SA, held an open house at its Rueil-Malmaison location (near Paris) to present its most recent products and those being developed in molecular beam epitaxy (MBE).

This open house was the first one organized by the company on MBE, another one having already been held on surface analysis, another Riber specialty. This presentation immediately followed the Fourth International MBE conference, that had met in York. The first international conference on this topic had been organized in Paris by Riber in 1978, and the next one will meet in two years in Sapporo.

About 180 persons from all over the world (Riber draws 85 percent of its revenue from exportation), two-thirds of them French, came to visit the fabrication shops and applications laboratory at Riber, a worldwide specialist in MBE, since the company lists among its customers the great names of the semiconductor industry in Europe, the United States, and Japan. The company employs about 670 people, 200 of them at Rueil-Malmaison. Its activities are divided into three departments: ultra-high vacuum, analysis (with systems using ESCA, AES, SIMS, LEED, and RHEED techniques), and semiconductors and advanced materials, which includes MBE systems as well as systems for depositing thin metal films in ultra-high vacuum. The visit to the company was preceded by a conference, presenting among other things, results obtained with its latest system, the MBE 32, as well as other products under development.

Multi-Chamber Modular System

The MBE 32 is the most recent system introduced by Riber in 1985. It succeeds the MBE 2300 introduced in 1981, which in turn was preceded by the MBE 1000 in 1979 and the MBE 500 in 1975; all of this adds up to more than 10 years of experience in this field. The latest model is characterized by a substrate carrier in 2" or 3" versions. The company presented the results obtained with the substrate carrier and the new mechanical attachment system that replaces the preceding method, which consisted of mounting the substrates with molten indium on a molybdenum carrier. The company also announced that it has under

development a system that allows the loading of a large number of substrates (10 to 20) as well as automatic transfer. Substrate transfer is actually performed with a carrier moved from one module to another under vacuum. A Riber MBE system is composed of in-line modules whose number can be increased as needed. The model used in the Riber's applications laboratory consists of a substrate loading module, a substrate preparation (degassing) module, and the epitaxial chamber, which is lined with a cryogenic double-wall. It includes a quadrupole analyzer, it can carry eight cells, and it can be equipped with a 10 KeV or 50 KeV gun. The supplies are rack-mounted and the system is automatically controlled by an IBM-PC. The laboratory is used to train Riber personnel and new customers, and to test new components developed by the company.

New Cells

The company also carries out research on cells, such as a high temperature cell for silicon doping (this type of cell is unique in the world), and for III-V compounds, an high capacity arsenic cell which extends the life of the cell.

Another development underway at Riber is the replacement of standard solid sources in CBE (chemical beam epitaxy) systems by gas sources to simplify system utilization. This would avoid the need to recharge cells or open the system, by simply changing a cylinder.

In surface analysis, the company should soon introduce a high resolution Auger microprobe (500 Angstrom spot and secondary electron image).

Multiple Applications

Riber is devoting significant efforts to MBE R&D, at a time when this technology appears to find more and more applications. Some of the examples given by Riber are integrated circuits (TEGFET), optoelectronics (lasers), and telecommunications (laser discs) for III-V compounds, as well as infrared detection for II-VI compounds.

11,023
CSO: 3698/138

BRIEFS

FRENCH INDIUM PHOSPHIDE PRODUCTION--A subsidiary of Pechiney Electrometallurgie, the company Metaux Speciaux SA, has obtained from the National Center for Telecommunication Studies (CNET-Lannion B Center), a license to produce indium phosphide (InP) polycrystals, single crystals, and polished wafers. This license agreement is consistent with Pechiney's policy to strengthen its position in high technology materials. The process acquired by Metaux Speciaux was developed by CNET in 1980. It will be used by Metaux Speciaux to produce the material at its plant in Plombiere-Saint-Marcel (Savoie) beginning during the second half of 1987. Like GaAs, InP belongs to the III-V compounds family but is not as widespread. It is currently becoming important with the development of optical transmission at wavelengths above 1 micron, to be used in high density networks as well as in new videocommunication networks. It is especially intended for optoelectronic components, hyperfrequency components, and fast integrated circuits. [Unsigned article] [Text] [Paris ELECTRONIQUE ACTUALITES in French 10 Oct 86 p 18] 11,023

CSO: 3698/138

EC OFFICIALS ON ROLE OF EUREKA IN OVERALL R&D STRATEGY

Private Industry Starts Projects

Bonn DAS PARLAMENT in German 16-23 Aug 86 pp 2-3

[Article by Jean-Pierre Contzen, Director General of the Joint Research Agency of the EC Commission, Brussels, and Professor Paolo Fasella, Director General of the Directorate General for Research, and Development and Joint Research Agency of the EC Commission, Brussels: "The Great Strategic Orientations--Perspectives of the EC Technology and Development Program"]

[Text] In the second half of the eighties the selection of scientific and technological activities will be guided more than ever by the need to strengthen the international competitiveness of the EC, in particular in the industrial sector, thus safeguarding employment. The establishment of research programs such as ESPRIT, BRITE, BIOTECHNOLOGY, the more recent initiatives of the commission in the area of telecommunications (RACE), and in the field of materials is due to this concern about competitiveness.

However, this issue must not divert the attention of the EC away from the other concern: to ensure an improved quality of life for all citizens. This is the justification for the R&D (research and development) activities in the areas of environment, health and security--in the broadest sense of the word. Moreover, it is important to strengthen the European scientific and technological potential in a non-discriminatory manner, in particular by breaking down structural barriers and increasing the mobility of researchers. A solid scientific basis is an essential prerequisite for the success of our future technological development; a true Europe of researchers must emerge, and we are working on it.

Finally, several EC policies require a solid scientific basis. This applies to the utilization of agricultural raw materials, energy supply, processing of primary raw materials, and development aid. The EC has developed a number of specific activities and will continue to pursue them with the goal of supporting the implementation of these policies on a scientific-technical basis.

We have been and will be concentrating our research and development activities more and more around a limited number of specific strategic goals:

--industrial competitiveness;

--quality of life;

--a Europe of researchers;

--specific services for policies in particular fields.

Added Value of Joint Research

The majority of these goals is certainly not specific to the EC; they can be found with different emphasis in the scientific and technology policies of all our European countries. Where then does the usefulness or even the necessity come in; how do we determine the added value which is derived from joint action?

We believe that this added value is determined by the following factors:

--The EC allows for a synergy of efforts and abilities; it thus favors the implementation of cost advantages by larger capacities and critical masses and offers diversification opportunities which are necessitated by a rapid and costly scientific and technical development.

--The joint action creates its own fertile ground for the growth of creativity and the cooperation of scientific and industrial operators in the strategic programs and in the high-priority and significant projects.

--The EC framework allows the implementation of operations of such a magnitude which would be impossible or very difficult for individual member countries considering the means required.

--The EC framework connects the technological initiatives with the large European market. In 1992, this market will offer the technology projects open public markets which will be based on common standards and a joint policy of industrial property.

--The EC framework also establishes a connection with a dynamic trade policy by strengthening and supporting the activities of researchers and of industry.

--Finally, the EC offers a framework of coherence which makes it possible to optimize the efforts of the member countries, to support their specific potential, to avoid duplication of efforts, and all this to the benefit of the whole EC and its regions. In this respect the EC tries to solve the difficult task of combining in one and the same policy the goal of competitiveness towards the outside with the goal of coherence within the EC.

The smallest common denominator approach will certainly not make it possible to solve such a task; on the contrary, each individual country must be held to the attainment of ambitious goals in accordance with its potential and special circumstances so that the scientific and technological level of the whole EC will be raised. This means to be unyielding in the demand for quality and not to give in to the convenience of the "juste retour".

This is basically our approach in the area of science and technology. In our opinion, it justifies the scope of our activities which we desire. However, these developments must not be exclusive. They must be closely integrated into the general framework of the scientific and technological policies as they are being developed by our member countries; in addition, they must be largely open to the outside.

Strengthening the EC's activities in research, development, and technology does not mean that the EC should insulate itself in the scientific and technical field within its geographic and institutional boundaries. On the contrary, this strengthening must go hand in hand with expanded cooperation on an international level, in particular in fields such as thermonuclear fission, and this in particular in the European area. In this respect the close ties as they exist with the European Science Foundation, the European Space Agency, CERN, and the European Council should be cultivated further and expanded by the implementation of joint projects.

In our opinion, the cooperation with the countries of the European Free Trade Association will reach a new dimension, both by a rejuvenation of the multilateral cooperation as it is being implemented within the COST-framework, and by the establishment of bilateral general agreements for scientific and technical cooperation, which have been signed already or are close to being signed.

How does the problem of relations between the EUREKA-initiative on the one hand and the efforts of the community in the fields of science and technology on the other hand fit into the framework of all these crosslinks?

The EUREKA-initiative is an expression of the political desire of the governments of 18 European countries to face the challenges posed by the development of new technologies and their integration in the industrial innovation process. The commission has supported this initiative from the very beginning guided by the consideration that community programs and the resulting projects--if they are carried out coherently and in symbiosis--and the EUREKA projects complement each other and thus constitute a unified whole. They can increase the productivity and competitiveness of industry and of the national European economies on the world market and thus contribute to the development of prosperity and employment.

But how do we determine this complementarity and avoid conflicts?

First, let us remember that the Hanover declaration of 5 and 6 Nov 1985 states more precisely that "the EUREKA-projects are not aimed at replacing existing

European technological cooperation--such as the programs of the EC...--or their future development. Rather, it is their goal to increase and complete this cooperation.

In this respect, the following pattern can be developed:

While the EC on the one hand carries out the development of programs with scientific and technological motives and structures it functionally according to goals, criteria, and priorities which have been defined together with the governments and industries of the member countries, the EUREKA projects on the other hand are carried out primarily on the basis of specific initiatives by companies which want to join their efforts. These companies are responsible for carrying out these projects and--in most cases--for their financing. These projects are primarily geared towards the joint development of advanced technologies which are close to the market or of infrastructures of transnational interest.

If a dialogue on the projects which have been announced or which are in preparation is organized early on, it appears entirely feasible that a clear and coherent interface between the EC activity and EUREKA-initiatives can be reached.

No Unproductive Rivalries

In addition to the special aspects related to the implementation of EUREKA projects the EC can also make a significant contribution to the so-called "additional measures." The EC efforts could consist primarily of a contribution to the organization of the large market, in particular:

--promoting joint standards;

--harmonizing tax measures;

--free movement of goods and capital;

--opening public markets.

Within the framework of its competitive policy, the EC could also facilitate R&D cooperation between industries as well as the utilization of results. From a legal point of view the creation of a "European Grouping of Economic Interest" should also encourage cooperation between companies.

Finally, the EC could contribute its finance engineering systems; in addition to the operations of a still modest scale which are being prepared in cooperation with the European Venture Capital Association (EVCA) of the "Venture consort" type, the commission is considering more ambitious initiatives such as the creation of one or several investment companies--Eurotech Capital--whose start-up capital would be strictly private, as well as the establishment of a guarantee mechanism--INSUR--with both public and private funds and covered by the Eurotech Capital-companies.

All these initiatives are intended to facilitate innovation, development of new processes and new products, in particular among small and and medium-sized companies.

In view of the internal and external challenges Europe cannot afford to waste its efforts in non-productive rivalries, promote duplication of efforts and encourage scientific and technological feudalism. The success of an enterprise which will have a decisive influence on its future depends on the coherence of its efforts. All efforts of the EC must be directed towards this goal.

EUREKA as SDI Response

Bonn DAS PARLAMENT in German 16-23 Aug 86 p 11

[Unattributed article: "A Civilian Response to SDI"]

[Text] As Brussels well knows, EUREKA is criticism, reaction, and response to the slowness of the EC bureaucracy. And this is why EUREKA counts on the market forces of research.

EUREKA is also intended as a civilian response to SDI. Here, it is obvious that civilian and military research cannot always be separated completely. This led to a controversy between the socialist and Protestant People's Party fractions in the European Parliament in June which finally resulted in the defeat of motion for a EUREKA resolution. The Social Democrat Rolf Linkohr had called EUREKA a balloon and myth. The Christian Democrat Bernhard Saelzer called EUREKA a desirable research and technology policy. A separation of civilian and military research would mean the end of all research policy in Europe.

This summer, the EUREKA initiative received unexpected support from a report which had been prepared and written by the Bonn Association for Foreign Policy [For translation of this report, see JPRS EUROPE REPORT: SCIENCE AND TECHNOLOGY EST-86-032 dated 31 Oct 86]. Its basic idea was: Western Europeans should consider themselves a "space power of the 21st century". Neither the FRG nor the other Western Europeans could leave space flight to others, since it has become an essential factor of foreign and security policy and also has an innovative effect on the economy as a whole. Therefore, more commitment and joint efforts are required. This report also spoke in favor of a German financial participation in the French space glider project Hermes of 30 percent.

The Fourth EUREKA Conference will probably take place in Stockholm in December.

PS: Incidentally, the EUREKA secretariat will be established in Brussels, in the Rue d'Archimede. Nomen est Omen.

12831
CSO: 3698/58

TRIPLED BUDGET, MORE BASIC RESEARCH URGED FOR ESPRIT

Paris ELECTRONIQUE ACTUALITES in French 10 Oct 86 pp 1, 3

[Article by R. Vaillant: "Second 30 Billion Francs Esprit Plan in 1987?"]

[Excerpts] Brussels--With the 1984-1988 budget of the European program Esprit presently exhausted, essentially due to the (too) great success it met with industrialists, the Brussels Commission proposes to launch in 1987 a new Esprit phase with a total cost of about 30 billion francs over a five-year period, and with particular emphasis on IC's, peripherals, design of information processing systems, and application of information technologies in applications systems (particularly for computer-aided production).

But--and the decision should be reached at the end of 1986--some EEC member nations balk at becoming involved into such an ambitious project.

This is essentially the gist of the third annual Esprit conference, which brought more than 1000 participants from 16 countries to the Belgian capital from 29 September to 1 October.

At this conference, during which papers and demonstrations were presented about 90 Esprit projects currently underway (Footnote 1) (With the participation of Bull, CGE-Marcoussis, Thomson Semi-conducteurs, CNET, Lep, Syseca, CCETT, Cap Gemini, INRIA, TITN, MHS, Sesa, and Framentec), the Brussels Commission announced 20 new projects in response to the call for proposals closed last July.

Covering topics not yet included in the program, such as VLSI manufacturing processes and automated flexible assembly, these 20 new Esprit projects represent a community budget of about 450 MF. The total cost of the projects, 50 percent of it financed by the commission, comes close to 900 MF. French companies, universities, or research centers figure in nearly four-fifths of these 20 new projects (Footnote 2) (Some of the participating French companies are Thomson Semi-conducteurs, Bertin, ES 2, Cerci, CEA-IRDI, Matra, Informatique Internationale, Tecsi Software, Cert, Bull, Chorus-Systemes, TRT, Syseca, and Cimsa-Sintra, as well as the research institutes INRIA and Laas among others).

As a whole therefore, Esprit now gathers together more than 450 different organizations and nearly 3000 researchers as part of 219 projects, all of them we might remember, concerning information technologies (TI). And the commission notes with satisfaction that of the 240 participating industrial enterprises, 130 are PME's with fewer than 500 employees.

Success Story

Today, two and one-half years after the program's start in January 1984, officials of DG XIII, the commission's division responsible for the community's action in the TI area, is drafting a success story. A success which actually exceeds all forecasts, to the point that there is no more money in the till: the EEC budget initially planned for the 1984-1988 period--about 5.1 billion francs--is now almost fully allocated, practically two years ahead of schedule. Moreover, many of the good proposals received after the recent call for projects had to be rejected: DG XIII could retain only one out of four.

One question remains: what to do now? What to do in 1987 and 1988, when as we have said, all of Esprit's budget has already been practically allocated? The commission feels that it is absolutely indispensible to launch a new, second phase of the Esprit program as early as next year. For this second phase, it proposes to almost triple the community's budget, which means about 15 billion francs spread over five years (1987-1991), for a total program cost of about 30 billion francs from all financing sources. All in all, this Phase II should represent a minimum of 30,000 man-years of research and development work, compared to 10,000 for the Phase I which is coming to an end.

To support these proposals, the commission is particularly insistent about the desire expressed by industry to devote a substantially larger part of its budgets to research and development projects conducted in collaboration with partners, which as we remember is the very essence of the Esprit program.

Reticent Member Nations

In concrete terms, the commission would like to orient Esprit's second phase along four major lines: microelectronics, peripherals (mass memories, non-impact printers, displays, translators), the design of information processing systems (particularly in two main directions: parallel architectures and signal processing systems), and integration of TI in applications systems.

In microelectronics, the effort would essentially cover Asic design, fabrication, and testing; optoelectronic IC's; multifunctional IC's; very fast IC's (together with development of specialized CAD tools and special encapsulation techniques); and combinational logic IC's (particularly with the development of a CAD system that includes automatic drawing placement and verification).

Still in semiconductors, the Brussels Commission also proposes the development of high density and low consumption lines, including production aspects (meaning the development of an automatic production flexible line).

Another key direction for Esprit II would concern the technology of TI applications, with particular emphasis on computer-aided production (CAD/IAO, advanced robotics and materials handling systems).

An effort will also be devoted to multimedia office automation systems, local networks, laboratory data acquisition, and computer systems for home surveillance and environment control.

Esprit's second phase should also include some fundamental research, whereas until now the program was concerned essentially with applied research. Among the topics being considered are molecular electronics, artificial intelligence, man-machine interfaces, as well as application of the physics of solids to TI.

It is also stipulated that nationals of the AELE zone (Sweden, Austria, and so on) will be able to become involved in Esprit II as full project participants, whereas until now they could be considered only as subcontractors.

All these proposals are currently on the table, as observed by Karl-Heinz Narjes, vice-chairman of the Brussels Commission responsible for industry, TI, and research. And, he indicated, the member nations should make their decisions known toward the end of the year.

As far as we can tell, it appears that some countries believe that the volume of appropriations planned for this second phase of Esprit is excessive. In Brussels, the Britisher Geoffroy Pattie, who currently chairs the council of EEC research ministers, noted that agreement on this point will not be easy.

Another point of disagreement between the commission and some governments, concerns the importance to be given to projects for integrating TI in applications systems: some countries want the effort in this area to be much more modest than proposed by the commission.

In any case, and in general, it appears highly desirable for the future of European electronics that as early as next year (and not in 1989 as would normally be the case), a new round of EEC appropriations be devoted to Esprit, so that, as noted by Michel Carpentier, director of DG XIII, the present impetus of the program will not be broken.

11,023
CSO: 3698/135

REFORM AT FRANCE'S CNRS STRESSES MANAGEMENT, BASIC RESEARCH

Paris AFP SCIENCES in French 18 Sep 86 pp 15-16

[Unsigned article: "CNRS Reform: Toward Stronger Central Management"]

[Excerpts] Paris--The winds of change are blowing at CNRS: the leading French research agency (25,000 people) is heading toward a significant change in its central management and national committee, while its commitment to conduct "basic research" is confirmed in the speech of its director general.

At the 11 September meeting of the agency's board of directors, Serge Feneuille, its new director general, presented in a note--which was criticized the next day by union organizations--the broad outlines of this reform: reduction of the agency's scientific management and regrouping of this management around the director general, as well as revision of the role, composition, and election of many commissions and councils.

With research activities being "piloted from the top" (by the general management), the "deregulation" according to researchers' unions, should constitute the other string in the CNRS reorganization (review of various procedures and operating regulations).

Strictly speaking, according to Richard Varin, elected board member (SNTRS-CGT), Mr Feneuille did state that in his view, the mission of CNRS was to "increase basic knowledge"; this statement should confirm the agency's fundamental commitment, but the representatives of the SNTRS-CGT, SGEN-CFDT, SNCS, and SNPCEN-FEN unions are questioning the action, notably with regard to the future of the research implementation structures that had been established at CNRS.

The strong point of this reform (the previous one dates back to 1982) is that the director general intends to form an "executive committee" with three or four scientific directors (there are currently nine) and some deputies. This new management staff will be more effective than the present general management, which Mr Feneuille indicates, surrounds him with about 50 direct collaborators. The director also charges the "fuzziness" of the operational structure as being responsible for the "fast verdicts" from outside: a glut in the central administration, multiplication of redundant structures, and scattered responsibilities.

The scientific departments of CNRS (whose numbers were growing) and the present institutes would continue to exist; but each would be managed by a director named by the minister in charge of research (they were formerly named by the agency's director general). Reporting in groups of two or three to the "scientific deputies" of the director general, depending on the specialties and work of these same directors, the "field agent" appointments of these department heads would be strengthened as a result.

In another area, research implementation, scientific information, and international relations activities, which currently fill three positions at CNRS, would be brought together under the jurisdiction of another of Mr Feneuille's direct deputies.

More broadly, Mr Feneuille also addresses himself to the multiplicity of scientific councils, departments, and committees at CNRS; their composition, roles, and leadership will have to be reviewed. In some observers' opinions, means will eventually have to be found to establish greater similarity between CNRS positions and those in universities or the private sector (by increasing the number of appointments), and to reduce union representation; directors' power would also be increased in department councils. At the same time, the role of delegated administrators and the existence of regional scientific delegates should also be questioned.

Another important agency reform is currently underway: its national committee, a sort of CNRS "parliament" which acts as a major instance in the operation of many administrative linkages, should find its election and operating procedures changed by decrees that are being prepared at the present time.

"New elections for the National Committee are already planned for around 15 December," indicated Paul Janiaud, secretary general of SNCS-FEN.

In general, researchers' unions believe that the new committee favors university personnel and reduces the representation of CNRS researchers and ITA's (engineers-technicians-administrators). Some unionists even feel that in addition to university personnel, scientists from the private sector or from agencies other than CNRS could sit on the committee, transforming it into a research committee for the scientific community, rather than for CNRS alone.

In general, a return to decision hierarchization is thus started (appointments for instance, henceforth having to always be approved by the next higher hierarchical level), with the unions believing that scientific consensus will be reduced.

Some unionists fear that the loss of influence on the part of organizations that represent the personnel at the agency's office level might have dire consequences, to the extent to which "scientific research is more than ever a political chip," as demonstrated by such decisions as the installation of large equipment (the Strasbourg synchroton, the move of the agency's documentation center to Nancy, or that of Ganil to Caen).

A strengthened central power could lead to an increase in technocratic choices, they believe, whereas the director general's note emphasizes its advantages for more efficient decision making.

"We are not opposed to reforms aimed at lightening the operation of CNRS," concluded Mr Varin, "and we are waiting to see before we judge, but we wonder whether this policy, which aims to satisfy various pressure groups, is the best for the future of research in France."

11,023
CSO: 3698/136

CNRS OF FRANCE ANNOUNCES FINAL 1987 BUDGET

Paris AFP SCIENCES in French 18 Sep 86 pp 16-17

[Unsigned article: "CNRS: Agency's 1987 Budget Draft"]

[Text] Paris--The CNRS 1987 budget draft, as presented to the agency's board of directors on 11 September: total subsidies would be 8.812 billion francs (compared to 8.145 for 1986 after cancellations of the budget collective).

Slightly more than 200 researcher positions have been created, while 300 ITA (engineers, technicians, administrators) jobs have been eliminated.

1987 CNRS Budget

Positions

Researchers	Created	+ 72 research supervisors first class
		+ 217 research supervisors second class
	Eliminated	- 86 research supervisors second class
	Changed	- 70 research supervisors first class
		+ 70 research directors second class
ITA	Created	+ 12 jobs (2 research engineers second class, 5 assistant engineers, 5 technicians third class)
	Eliminated	- 327 jobs
	Changed	- 25 studies engineers second class
		+ 25 research engineers second class
		- 40 technicians third class
		+ 40 assistant engineers
		+ measures associated with statutes

Appropriations

1987	Total subsidies	
	Ordinary expenses + program authorizations	8,812,531,240 francs
	1986 review	8,950,874,014 francs
	1986 after cancellations	8,145,874,014 francs
	1987/1986 after cancellations	+ 8.2 percent

Of which:

1987	Ordinary expenses	6,632,531,240 francs
	1986 review	6,652,274,014 francs
	1986 after cancellations	6,077,274,014 francs
	1987/1986 after cancellations	+ 9.1 percent

Actually, 300,000,000 francs of working capital were cancelled in 1986 and thus did not affect the postings of the present fiscal year; this brings the real increase in 1986/1987 after cancellations to 4.0 percent.

1987	Program authorizations	2,180,000,000 francs
	1986 review	2,298,000,000 francs
	1986 after cancellations	2,068,000,000 francs
	1987/1986 after cancellations	+ 5.4 percent

11,023
CSO: 3698/136

BRIEFS

CANADA FUNDS EUREKA PARTICIPATION--Ottawa--Canada's minister of industry, Michel Cote, announced on 30 September in Ottawa, the creation of a government program aimed at helping Canadian enterprises to participate in the high technology research and development program implemented in 1985 by the European industry as part of the Eureka program. Mr Cote stated that the Research Program Into Technological Possibilities in Europe (PRPTE) will allow Canadian enterprises to participate during the next five years, in research and development programs in the public and private sectors, which represent billions of dollars. "Our objective is to aid the growth of a vigorous advanced technology industry in Canada, thanks to cooperation between Canadian and European enterprises," Mr Cote pointed out. "Our industry can derive significant advantages from its participation in projects of the Eureka program," while providing Europe with "the great capabilities we have acquired in high technology." For the first two years of this program, the Canadian government plans to devote the sum of 20 million Canadian dollars (about 14.2 million American dollars). [Unsigned article] [Text] [Paris AFP SCIENCES in French 2 Oct 86 p 9] 11,023

CSO: 3698/135

CSSR: COPYRIGHT PROTECTION OF COMPUTER PROGRAMS

Prague NETTO in Czech No 6, 1986 pp 15, 16, 18

[Article by Doctor of Law Josef Bejcek, candidate for doctor of science, Law Faculty, University of Jan Evagelista Purkyne [UJEP], Brno: "Protection of Innovative Programming"]

[Text] Introduction

The growth rate of our economy depends in part on legal protection for innovators. Legal protection offers both individuals and society some legal certainty that can be used to reconcile individual interests with those of society. The simplest means for guaging economic efficiency is to compare expenditures with achieved results. Expert estimates suggest that currently expenditures on software for automated control systems account for about 90 percent of the value of the system [10 percent hardware, 20 percent program creation, 50 percent program maintenance, 20 percent program modifications]. The simplest way to modify the above ratio is to reduce costs in one area at the expense of another, which just happens to be, by the way, the politico-economic basis of every unjustified increase in wealth. Given the cost relationships between hardware and software, the natural focus of cost-cutting measures is the software portion of computer systems. Computer programs--being intellectual creations--generally are very valuable (because of the amount of socially necessary labor involved in them). They even have an exchange value (they can be considered a good), and therefore must be included under the legal protection system for automated control systems. In this regard, a distinction needs to be made between protection of a technical nature (which includes hardware), and the protection of software innovations. This is because technical innovations generally fall under the category of improvement proposals or inventions, and as such are entitled to protection, while the situation regarding software innovations is somewhat more complicated.

The Potential for Copyright Protection

The basic question that must be addressed is whether or not a program can fall under copyright law, i.e., does it meet the criteria of an authored work.

1. To do so it must be the work of a single author, the outcome of his creative activity. An author can be only a physical individual. A legal individual such as a socialist organization cannot fulfill the criteria of creative activity and therefore cannot be the original subject of copyright law. Such an organization can, however, make use of an authored work with permission of the physical individual.

2. A protected work must be literary, artistic or scientific. Clearly, given the nature of computer programs, they would be considered a scientific work. The work, however, must result from the creative activity of the author. The most important part of a computer program is the algorithm that handles the actual resolution of the task. The development of an algorithm is, to be sure, highly creative work, but not sufficient for the granting of copyright protection. The public interest in scientific and technical progress cannot take a back seat to the individual interest of a creator. It is not possible, in other words, to copyright thoughts, laws, theories, and discoveries of laws of nature, but it is possible to copyright specific formulations and codifications of thoughts. Thoughts cannot be monopolized and patented. Specific technical resolutions may be. An authored work must be distinctive, unique. It must have content that can be expressed in different ways, and the form of expression must be completely independent of that content. (Such is not the case, for instance, with mathematical formulations of mathematical relationships).

3. An authored work must be capable of being expressed in an objective form that makes it possible to comprehend the ideas it contains. The algorithm of a solution may be expressed in various ways, i.e., in graphic form or in different programming languages. This objective fixation of a thought, to the extent that it is independent of the content of the thought, constitutes a manifestation of individual effort and may therefore be copyrighted. The objectivization--making thoughts accessible through a comprehensible form--must, in other words, be the result of individual creativity, not predetermined by the content of the work. The most creative parts of programs--the algorithms as thoughts--are not therefore subject to copyrighting. The creative character of transferring an algorithm to a programming language is for the most part independent of the content of the algorithm, but in many instances involves totally routine activity (and is even performed by machines on occasion). A priori, therefore, one cannot rule out the possibility of copyright protection for a program, even though in most instances a program will not meet the conceptual requirements of an authored work because it does not require sufficient individual creativity. Whether these conceptual requirements are in fact met must be determined in a case by case basis.

It is interesting to compare our laws in this area with foreign judicial precedent. In the Netherlands, for instance, a computer program can be considered a work under copyright law. The protection afforded, however, is limited and grants no monopoly on "know-how" that may be contained in the computer program. Similarly, Japanese courts have ruled that specific programs fulfill the conditions for a copyrighted work, and their unauthorized

reproduction can result in suits for damages for violating copyright. In Hungary programs fall unambiguously under copyright protection. The same is true in France, Australia, and Canada.

Recognition of the peculiarities of programs as subjects of copyright law and the difficulty of protecting them in Japan has led to an attempt to grant the right to use a program solely to the person that wrote the program. The right to use given programs would be listed in a special register and published. Programs would be protected for 15 years, and an earlier listing would not be an obstacle for a new program. The creator of the program would have the right to permit others to use a program or to grant licenses for it. It would also theoretically be possible to arrange for limited licenses in the public interest.

This protectionist proposal, which could hold up technical progress, met with resistance both in Japan itself and abroad. This is because the passage of such a law would isolate Japan from other developed countries. The Americans, for instance, explained their opposition on the grounds that Japan had to a large extent used American technology to reach the same state of the art level as the Americans in computers. American government representatives even threatened countermeasures in the event that any law governing the protection of computer programs would be instituted in Japan.

Copyright protection, which in any event is rarely used in the case of programs, does not exhaust the possibilities for protecting programs. Under Section 24 of Law No 84/1972, Sbornik, a program cannot be recognized in our country as an invention, because it fails to meet the legal requirements. An invention must represent a solution to a technical problem which is new and which, in comparison with worldwide conditions, represents an advance, as shown by new or greater efficiency.

Computer programs and algorithms do not solve technical problems. In the best of instances they are merely a mathematical means for solving these problems. In determining whether they qualify for protection one must determine whether a given solution relates to the structural-equipment portion of a computer installation (the hardware) or the software portion of that installation. A solution that relates to the machinery, wiring or operation of computers fulfills the requirement of solving a technical problem and may therefore be protected by copyright or patent law.

There is no precedent anywhere in the world (with the exception of the above mentioned but unpassed Japanese law) for the protection on an exclusive basis (patents) of mathematical techniques. Some countries, e.g., France and Poland, specifically exclude programs from patent protection in their legal codes, while other countries (among them the CSSR) are leaning in this direction based on legal opinions of state agencies involved in applications.

Under our legal code a program may be classified as an improvement suggestion if it solves a specific production-technical, technical-organizational, or

organizational-economic problem within an organization, if the resolution is new to the organization in question and if it contributes to the public good.

However, a program written within the context of a job description or a specific assignment, even if that program resolves some problem, does not qualify as an improvement suggestion. In fact, most of the innovations in applications software come during the normal execution of programming activities.

The legal protection of the commercial information contained in programs is a concern of socialist organizations. A program represents certain professional knowledge, experience or capability that is not necessarily generally known and the attainment of which often requires great effort, cost and ingenuity. It is what is known in business parlance as "know-how" that is information with a significant market value which can become the object of unfair competition. This value can be protected either through signed economic agreements (which have some relative value, but which are between the two signatories and do not extend to third parties), or may depend on the provisions of the commercial code governing cooperation among socialist organizations. (This protection under law is absolute, and applies to all potential violators). Organizations are not permitted to use their economic position to attain unjustified or inappropriate advantages at the expense of other organizations or of consumers, or to conduct business in any other way that may run counter to the interests of society. They may not have dealings which, in conflict with the interests of the national economy, limit or otherwise have a negative impact on the operations of other organizations, or which put consumers at a disadvantage. Plaintiff organizations may use commercial mediation to force another organization that may be conducting business in violation of these principles to cease and desist, or to rectify the illegal situation. An organization that has violated the rules of cooperation and in so doing has damaged another organization is required to make compensation to that organization, including any lost profits.

Section 123 of the commercial code, concerning unjustified acquisition of property has some practical significance in the protection of programs. If an organization acquires certain property illegally (if for example it performs some computer work for which it is compensated on a program that does not belong to it), those funds must be returned immediately to the organization from which it acquired the program illegally. This regulation is advantageous because it is not necessary to prove the guilt of the other organization as is the case when prosecuting for compensation for damages.

The legal regulations of the commercial code also offer protection against certain unjustified handling of programs. If a program is delivered as a part of a computer system and the consumer then publishes the program or makes it available without the consent of the supplier or in conflict with the terms of the sale of the computer system, it is required to pay a penalty of 10 percent of the value of the delivered system (including software). The obligation to compensate for incurred damages includes an obligation to

compensate for lost profits (section 90 of decree No 13/1985, Sbornik). If a program is delivered independently and an organization, in violation of the terms of sale, makes its documentation available to another user up to 5 years from program installation, the second organization is liable for a penalty of 10 percent of the price of the illegally transferred documentation (section 13 of decree No 49/1985, Sbornik). In this case as well there is a potential obligation to compensate for damages. The above forms of protection are meant to be deterrents. In the event that the law is actually broken, any transfer of property does not have to compensate fully for any losses from the unjustified publication of a program. Also, the activation of any of the above legal defenses clearly makes it necessary to open the program up to scrutiny, which carries with it the danger that the program may either be copied or misused in some other way. For this reason some large firms leave their programs without any legal protection and take technical and organizational measures to secure them.

9276/12851
CSO: 2402/11

CSSR: USE OF COMPUTERS IN SLOVNAFT ENTERPRISE

Prague VYBER INFORMACI A VYPOCETNI TECHNIKY in Slovak No 4, 1986 pp 531-535

[Author not identified: "Experience with Use of Computer Technology in the Slovnaft National Enterprise"]

[Text] In mid-April of this year, a press conference was held at the Slovnaft National Enterprise with Engineer Sajmir, Economic Deputy, and the employees concerned with the subject of using computer technology in production planning and control at the Slovnaft National Enterprise in Bratislava. The press conference included an exposition of several computer technology devices at Slovnaft. We provide below a selection from the information provided there.

Characteristics of the Computer Center

The computer center has been in operation since 1965. For almost 20 years a second-generation NCR 315 computer was used. In 1980 extensive technical innovation began with the installation of the systems for data gathering and preprocessing. The effort to have the user enter most of the operative data into the system onscreen, while at the same time taking responsibility for the data, was successful. In 1982, the installation of a new Robotron EC 1055 central computer system began. In addition to the central unit from the GDR, the system included domestic and foreign peripheral devices.

In order to achieve the potential to build a central data base for the enterprise that would work in real time, the computer system was enhanced in 1986 by another central unit, the IBM 4361, and other IBM peripherals.

As a result, there is now a two-processor system with its own terminal network functioning under equivalent operating systems.

In addition, microcomputer technology is being introduced intensively. Purchases are centrally coordinated and use is decentralized in individual specialized sections of the enterprise.

Use of Personal Computers

The use of personal computers will soon become an essential part of the enterprise control system. In addition, personal computers will be used

for economic and technical calculations in the enterprise engineering practice. On the basis of PC user experience worldwide, we anticipate that in the next 5-10 years there will be 4 PCs for every 100 employees of the enterprise. Eight PCs for every 100 employees may be considered a low estimate of saturation.

Areas of Utilization

On the basis of the possibilities of PCs and the structure of work a activities in the enterprise, it is assumed that PCs will be used in the following areas:

- rationalization of the completion of written materials [word processing];
- small-capacity filing;
- invoice filing at lower control levels;
- simple economic and technical calculations;
- preparation of data for higher automated control systems;
- universal use for all the above-mentioned areas.

Use of Computer Technology and Economic-Mathematical Methods in Production Planning

The encroachment of computer technology and economic-mathematical methods into management areas is to a certain extent the logical consequence of inadequate traditional methods of management as regards the demands placed by management on the production process at the current level of development. The difficulties arising from the inability to process information necessary for management quickly by using traditional methods can be overcome through the use of computer technology and suitable mathematical and economic methods.

The Slovnaft National Enterprise has chosen this approach (which while not simple is the only possible one) to solving the problems of production planning, which, given the conditions at this enterprise, is a complicated and very serious question.

The result is a routinely used and relatively independent (ASŘP) system for computing the production plan using computer technology. This system provides the user with complex, detailed, rapid and accurate data on the production plan, the conditions for its fulfillment, capacity utilization, the fulfillment of the GO Plan, the creation of supplies of semifinished goods, bottleneck areas, etc. These data can effortlessly give the user variant outcome projections (depending on different conditions) according to his demands and needs.

The basis of this system is a modeling approach (creation of mathematical models), suitable application of the linear programming method (optimization method), and its realization using efficient computer technology (EC 1055).

Thus the Slovnaft National Enterprise is one of few enterprises today that is devising its production plan using the linear programming method and

computer technology. At the same time, it is necessary to note that the scope of the tasks being solved within the production plan is unique in the practical application of linear programming in the CSSR. By the use of terminals (at which all necessary data are input by the user), this system of production planning by means of computer technology is situated closer to the user and is more accessible to him, and does not demand special knowledge either of computer technology or of linear programming. Monthly, quarterly and annual production plans are currently drawn up using this process.

It should be emphasized that in solving this task, cooperation with the mathematics department at the FJFI CVUT Prague (Czechoslovak Technical University) has proven extremely helpful. Its employees contributed significantly and substantially to the successful solving and realization of this task.

The use of computer technology in projecting interenterprise costs and the yields of individual production centers promotes the thorough application of khozraschet cost accounting methods in interenterprise management (including planning). The "chemical production centers budget" project, a follow-up to production plan processing using computer technology, makes possible a detailed interenterprise breakdown of the production plan, costs, and outputs of individual production centers on the basis of relatively small amount of input data (usually taken from calculation of the production plan). Again, data are input at a terminal. Without computer technology and without automation of this work, it would not be possible to secure an accurate and timely interenterprise breakdown of the plan that would be of value in khozraschet cost accounting management. Interenterprise breakdowns of production plans, costs and outputs are follow-ups to the calculation of production plans and are processed as monthly, quarterly and annual breakdowns. The information they provide is arranged hierarchically according to needs and management level.

The breakdown and analysis of the production process is closely connected with the constant improvement and enhancement of management methods. Considering the amount and extent of the data to be processed, analytical activity today is unthinkable without the use of computer technology.

Because of the information requirements of employees in managerial positions as regards data on the course of the production process and the need for analyzing and evaluating it, a project called Technical-Economic Analysis of the Production Process was devised and is still in use today. This project provides complex, extensive, analytical, technical and economic data about the course of the production process in both quantitative and value terms (consumption of raw materials, semifinished products, chemicals, energy, fuel, outlays for overheads, etc.). The results of the plan, actual achievements, and conditions as compared to a normal base (in the case of individual types, items--in a detailed structure) are compared. In addition to analytical information, the project also provides aggregated information, qualitative indicators of the course of the production process (cost factors, holding down overhead outlays, economic

results from the centers and plants, etc.). Here again, information is arranged hierarchically and aggregated according to the level of management it is intended for (production managers, operation managers, plant managers and enterprise directors). In this way it is possible to give uniform and accurate information (that is also suitably extensive) to each level of management for the needs of breakdowns and analysis. Considering that the results of the analysis in turn influence the planning process, the project results are used to a large extent in the creation of production plans and in devising the interenterprise breakdown of plans, expenses and yields.

These systems (projects) are not content to report the present state or even with good results; they are developing further and are trying to enter the operational control as well (i.e., processes carried out in a time span of less than one month) and to satisfy the needs of top level management better.

Prospect of Further Automation of Technological Processes at the Slovnaft National Enterprise

Toward the end of 1985 an approach to developing a subject area through 1990 with a view toward 1995 was devised to meet the needs of GR Slovchemia. The materials were taken from the basic concept of the VHJ (economic production unit), not just in terms of categorizing the extent of individual introduction of computer technology but in terms of the methods of building control systems as well. At present a program is being set up for a complex development at the Slovnaft National Enterprise which will include the development of automated control of technological processes. Several of the basic characteristics of this development are described below.

Present state of development

The worldwide developmental trends of this subject over the past 15 years may be characterized as follows.

At the beginning of the period, mechanization and robotization technology, which is closely associated with the practical application of control computers, was exclusively pneumatic. Gradually, after questions of insulation and electric spark safety were resolved, electronic systems appeared. Development tended toward the elimination of moving parts, the electronization of all components, and finally the placement of microprocessors directly into regulators and final components. In contrast, the development of control computers is shifting away from the original focus on strong centralization and is moving in the direction of distribution control systems. It is fair to speak of a certain merging of both systems. Modern control systems represent a division of the functions of control computers horizontally--which occurred when group digital regulators for microcomputers with significantly higher universality and particularly reliability were created--and also vertically--with basically three levels of control. The first level, i.e., contact with the processor, includes

the microcomputer group regulators referred to above and well-designed multiplexers for data collection. The level of operator contact with the process includes microcomputer operator work centers which have taken over all the metering, alarm triggering, recording and protocol functions of conventional supervisors by using color graphics screens coupled with printers. The uppermost level includes a processor computer which takes over the tasks of long-term filing of the variables observed, the processing of operational protocols, including related variables for effectiveness, fulfillment of the THN, observation of equipment running time, and the balancing and optimization of the technological process. All elements of the control system are connected by a communications system which permits rapid transmission of the information sought. The reason for the distribution of functions is above all a significant increase in universality. A local cutoff of a module is secured by an automatic backup, without interrupting the functioning of other parts of the control system. The design is modular, has a block character and includes modules which, in practical application, do not need to be programmed but are simply configured from a given set of prepared algorithms.

The first system of this type was manufactured by Honeywell under the name of TDC 2000 (Totally Distributed Control). From its first application 10 years ago the system was used in more than 2,500 cases with a total number of controlled circuits exceeding 320,000. Today similar systems are being manufactured by all major industrial firms, such as the Spectrum from Foxboro, Micon from the VDO company, Damatic from the Valmet company, Provox from Fisher Control, Micro from the Controle Dailey firm, Audatec from the GRW Teltow company, and Deris from VUAP Prague [Research Institute for Automation Devices] or ZAVT [Plants for Automation and Computer Technology].

Extent of Application at the Slovnaft National Enterprise

Considering the nature of the technologies at the Slovnaft National Enterprise, three groups are involved in using the control computers.

Small applications--A microcomputer control system is used here for a single purpose. It is connected to a process only by several inputs and one or two outputs. A typical example is the control of the burning process in an industrial furnace.

A medium applications system is used for the coordinated control of one apparatus. Several goals can be set, for example a limited composition and energy savings. A typical example is the control system for columns (for example orthoxylene in aromatic substances) or a reactor.

Large applications--a distributed control microcomputer system (i.e., several microcomputers connected to one another) is used for the control of an entire complex or the production of a plant. Its screen units take over all conventional monitoring functions.

The Automated System of Balanced Manufacturing holds a special position in this subject. It includes microcomputers with basic collecting units

with several tens of inputs for manufacturing but without control functions. It is therefore advantageous to group the balance functions in large application process computers.

Limiting factors

Several factors limit the successful incorporation of domestically produced computer technology into the control systems for technological processes, i.e., where they would produce significant energy savings, contribute to stabilizing or increasing the quality of production while decreasing costs, and significantly increase the operational reliability of technological processes, particularly as a result of operators being better informed about the control process, thereby increasing the operational cycles of periodically working apparatuses and constantly monitoring critical parameters. These factors are:

1. The unavailability of primary measuring transformers and output regulating valves;
2. The unavailability of modules for connecting to the process while maintaining safety in terms of explosive potential;
3. The unavailability of domestically produced control microcomputer systems;
4. Great limitations in the possibilities of configuring the required systems (shortages of terminals, disks, printers, etc.);
5. Low reliability of computer technology for this use;
6. Absence of standard program devices that make it possible, without programming and by configuration alone, to create the necessary control structures. Not even the design or research institutes have undertaken the task of designing the control structure itself, and this cannot be expected to be the case with the manufacturers of computer technology either;
7. Missing components suppliers of systems.

Under these conditions the final user is forced to buy individual systems parts from various organizations while having to deal with long delivery lags, this while each delivery of course guarantees only a part of the system. The final user must complete and install the entire system by himself, design, adjust and evaluate complex control structures, and above all to a great extent he must improvise. In addition, all final users must actually build their own units for these activities, which from the standpoint of the entire society is unjustifiable. When the life-span of the system is compared to the time of implementation of the system, its original intention becomes illusory. Let's compare this situation with the introduction of the microcomputer regulation system on a orthoxylene column, where installation and start-up took two weeks while the production was in full swing, and in another two months of tuning, the control structure of the system was capable of making the expected contributions.

The situation must be solved by a basic system in all the above-mentioned as well as related areas. Only in that way will it be possible to meet the main goals of development of society in the area of industrial electronization and the intensification of existing production.

12993/9190
CSO: 2402/10

HUNGARIAN LANGUAGE SPEECH SYNTHESIS SYSTEM DEVELOPED

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 5, 1986 pp 247-255

[Article by Dr Gabor Olaszy, electrical engineer at the Language Science Institute of the Hungarian Academy of Sciences, Gyorgy Podoletz, assistant instructor at the Budapest Technical University, Jozsef Fiser, student at the Budapest Technical University, and Andras Poppe, student at the Budapest Technical University: "Development of a Text-to-Speech Speech Synthesis System Operating on the Linear Prediction Coding Principle"]

[Excerpt] An LPC Text-to-Speech System Speaking Hungarian
Can one make such a machine with an unlimited vocabulary which can produce, from text written in letters, speech which is easily understood and in a natural voice? The answer to this question is yes. Understandability is provided by the present formant coding TTS systems, and favorable experiences with limited vocabulary LPC systems offer hope for satisfying the demand for a natural voice.

A limited and unlimited vocabulary formant synthesizer and a limited vocabulary LPC synthesizer already exist, but--as far as we know--no one in the world has yet made a text-to-speech speech producing system on the LPC principle. In 1983 we took as our goal the creation of such a system at the Communications Engineering Electronics Institute of the Budapest Technical University. What is the basic difference between the databases of a formant based and an LPC based TTS system? It is that with formant synthesis we must provide phonetic based data (formants, intensities, etc.) while with LPC systems we must store well selected wave form pieces from living speech. The formant based systems provide a pure mechanical voice; the tone of those based on LPC is close to the tone of human speech--since the starting point is a human voice. In order to realize an LPC based TTS system we had to solve a number of partial tasks serious in themselves. Let us first look at how a TTS system works. Figure 4 will help us here.

First the computer transforms the discrete symbol series at the input (e.g., the characters of a text typed in from a computer keyboard) into a phoneme code series. (By the phoneme set of a language we mean a minimal collection of voice elements from which every word can be produced at the brain level of human speech processing with correct meaning but only one way.) After the computer has produced the phoneme code series (this is a series of numbers)

corresponding to the text arriving we must seek, with the aid of the set of rules, the control parameters in the database needed to operate the synthesizer. The set of rules also serves to modify the primary parameter sequence thus produced according to diacritical and other marks (tune, emphasis, intonation). If a forbidden character sequence arrives at the input of the computer then, in general, this is compared to the elements of the dictionary. If the character sequence is in the dictionary then the system pronounces it, if not it does not. It can be seen that the most important parts of a TTS system are the database and the set of rules.

So our first goal was to prepare a database for an LPC coded TTS system (that is, a collection of LPC parameter vectors for voice slices making up the articulated sounds and the linkage sounds) and the set of rules needed to handle them. What steps are possible in the creation of such a database? Certainly the first step is to define the linguistic material (the elements of the input speech) which will contain all the sounds and linkages of the database to be created. To do this one must know the acoustic building blocks of Hungarian speech, the structure of the linkages, how individual articulated sounds affect the linkages, what elements the composite sounds (e.g., g, d, ny) consist of, the duration of transitional phases in some linkages, etc. So to compile such linguistic material we have to have speech acoustics and phonetic information. In our case 165 suitably selected monosyllables (e.g., bab, bob, sas, szasz, szisz), as a primary database, make up the basis for the final database of the LPC TTS system. This linguistic material was put on tape by a man with a nice voice in such a way that the pitch and intensity should be kept as level as possible throughout the recording. Later this tape recording constituted the input analog signal. The next step in developing the system was to digitize the 165 monosyllables and store the samples on magnetic disk. Thus we got the primary digitized version of basic material to create the database. But these monosyllable elements do not constitute the database of the LPC TTS system being created; rather it is made up of the so-called slices cut from them. Again one can decide only on the basis of phonetic and speech acoustics information where and for how long elements must be cut from the monsyllable voice sequences. In our case we designated a total of 455 slices (a voiced part shorter than a sound) out of the 165 samples.

In the next step of the development we developed the actual database. We cut the previously designated 455 slices out of the digitized monosyllable sequences, gave them serial numbers, and recorded them on magnetic disk according to the serial numbers. This constituted the starting database for the base version of the LPC TTS system. We say base version because the development of a TTS speech system takes place in such a way that we create the theoretically planned system and then develop and improve the sound of it in the conversational mode (listen to it, make changes in the database and the rules, correct it and listen to it again).

Development of the Primary Database

For the work we used a CLZ 80 model 8 bit microcomputer in the transmission and system technology department of the BME HEI [Communications Engineering Electronics Institute of the Budapest Technical University]. We connected an A/D input and a D/A output peripheral to this microcomputer to make possible digital processing of speech. The A/D transformer samples the signal at a

frequency of 8 kHz, then digitizes it at 256 quantization levels. One digital sample can be depicted in 1 K bytes, so 8 K bytes of storage are needed to store one second of speech. A program called BETG (this program was prepared in 1983 for the LIAWOX speech synthesis system) accepts the 165 samples individually, places them in storage, sends them from storage to the D/A output and displays them on an oscilloscope. Thereafter we call that part of the memory of the computer to which the BETG sends the samples coming from the A/D transformer or from which it sends the samples to the D/A output the display area. After the sound element was accepted we designated that part of the display area where the valuable digital samples were. We depicted the output signal of the D/A transformer--that is, the image of the time function of the syllable--on one channel of our two channel oscilloscope system; we cut a light point from the beam of the other channel. This light point can be moved on the screen like a cursor with commands given to the BETG program so we can designate the beginning and end of the sample. One can write out addresses corresponding to the beginning and end point. We saved on floppy disk the beginning and end address and the given area thus designated. We called the samples saved the source file. We prepared 165 source files; together they make up the primary database.

Development of the Secondary Database With the POFI Program Package

In 1985 we developed the POFI program package to develop the secondary database. The secondary database consists of short (10-80 ms) slices which we cut from the members of the primary database. The entire secondary database contains about 450 slices. At present the program package provides the following functions:

--cutting slices from the source files, giving them identifiers and storing them,
--correcting the slices,
--stringing the slices, and
--automatic stringing of the slices; wave form coding text-to-speech transformation.

During system design the biggest problem was independent management of the nearly 450 slices. (Only 125 identifiers can be given on one floppy disk.) We chose the following method for this: We organized 10 slices into one file, thus we need only 45 files, which fit easily onto one disk. Thereafter we called a file consisting of 10 slices a slice file. In order to be able to cite the slices with individual identifiers we did the following:

1. We defined the syntax of the name of the slice files as follows--the name can only have the form No, n, m, where n and m are decimal digits.

2. We numbered the slices within a slice file from 0 to 9. Then the user can easily access the slice selected by him with the code triplet nmx, where x is the serial number of the slice in the file. We call this code triplet the slice number.

In order to be able to access a slice from a slice file we must know at what memory address the slice begins in the slice file and how long it is. Which source file the slice comes from and at what address it begins in the source

file is important information for the user. We created a so-called address table in every slice file for these important data.

Primary Designation of the Slices of the Database
In order to be able to prepare the slices with the POFI program package and store them on floppy disk we must first determine how many slices of what duration we are cutting from each of the 165 samples and where these cuts begin in the sequence.

So as a first step in actual preparation of the slices we prepared phonograms of the 165 monosyllable sequences and manually designated (drew in) on these the beginning and end points of the planned sound slices (see Figure 5). We provided the slices with serial numbers according to the following system.

We designated three types of slices for vowels--time function parts realizing the beginning, internal and ending sections of the sound (see Table 1).

Table 1.

Vowel	Beginning		Internal		Ending	
	Serial number	Duration (ms)	Serial number	Duration (ms)	Serial number	Duration (ms)
a accented	1	90	11	90	21	80
a	2	80	12	80	22	80
o	3	70	13	70	23	70
u	4	60	14	60	24	70
u umlaut	5	60	15	60	25	70
i	6	50	16	50	26	70
e accented	7	80	17	80	27	80
o umlaut	8	60	18	60	28	70
e	9	70	19	70	29	70

We did not design separate slices for long vowels; we create them by extending the duration (e.g., by doubling or tripling the slice). We must also provide slices to realize the mute phase parts of a sound and the pauses. We designed three types of slices for this distributed as follows:

serial number 10 lasts 100 ms (for stops and pauses),
serial number 20 lasts 80 ms (for the ty, c and cs sounds), and
serial number 30 lasts 30 ms (for prolongation).

For consonant-vowel and vowel-consonant links we developed or designed the parts to be cut as slices so that later when compiling a sound sequence we could create any position linkage. As an example we publish the sound slices we designed to realize the b and p sound and the vowel linkage sections which can be joined to them (see Figure 5). We selected in two ways the beginning voice for the b sound; slice 31 contains the beginning element of the voice, slice 32 contains the further section. We designed this element 32 to use for realization of the voice of the long b sound so that we can double or triple the slice and thus get the long voice. We designated element 32 in such a way that the amplitude in it should have nearly the same value, thus achieving

continuity in the linkage. Elements 33-40 are called on to realize the end plosion of b for the various vowels; elements 41-49 are called on to realize the end plosion and vowel transitional phases. The sound slices thus far are used for consonant-vowel linkages, e.g. ba, bo, bi, etc. With the wave forms of slices with serial numbers 51-59 we realize the part of the several vowels connected to the b sound. Element 60 is intended to produce the b voice at the end of the series and the b voice within the series. Thus we use elements 51-60 for the consonant-vowel linkages. Slice 61 serves exclusively to produce the end plosion and after-ring part of the series ending b sound. One can see from the example that we have a total of 21 wave forms to realize the b sound and its sound environment. If we proceed the same way with the p sound we would be doing nothing more than mechanically using the method shown for the b sound for the p sound. But our goal is not to store every linkage element separately, because then we would have to store more than 1,000 linkage parts for the different beginning, middle and ending sound sequences. This would mean more than 3,000 sound slices and the memory area required would be large. We posed as our goal the development of a minimized element number database. To do this we make use of simplification possibilities already discovered by the science of phonetics with the use of which one can reduce the number of slices in the database without hurting the quality of the speech. So, in the case of the p sound, we observe that b-p is a consonant pair. Starting from the same generation locus the transitional sections of the vowel linkages to these consonants can be called nearly the same; they have the same structure. So we do not much falsify the acoustic structure of speech if we proceed by storing these vowel sections only once (best from the voiced linkages), and use the same ones for the unvoiced pair linkages also. According to this solution we use slices 41-49 and 51-59 of the b sound in the p + vowel + p linkages also. For example, when building a sound sequence, we link the wave forms with serial numbers 31, 32, 34, 42, 2, 2, 52, 60, 34, 42, 2 and 22 for the word "baba" and the slices 62, 42, 2, 52, 20, 62, 42, 2 and 22 for the word "papa." In a way similar to what is shown in Figure 5 we designed a minimized number of sound slices (450 slices) needed to create all Hungarian sound linkages to process the entire database. It is interesting that the combined enunciation time for the 450 slices is 32 seconds, about half a minute of speech. Using present packing procedures this can be placed in a 16 K byte EPROM, which makes possible the construction of small size speaking circuits.

The Syllable Slicing Program

Temporally and logically this is the first member of the POFI program package. With this program we prepared the cutting of and stored on disk the 450 slices from the 165 samples.

Preparation of the sound slices takes place as follows: First the slicing program loads onto the display area that source file from which we want to cut the necessary slices. The BETG program then appears. The beginning and end of the slice to be cut can be displayed on the screen of the oscilloscope. Returning from the BETG program the program copies the designated samples into the previously selected slice file. Naturally one must also log the important data on the slice into the address table.

The Correction Program

This program, in regard to its operating principle, is similar to the slicing program. The difference between the two is that a new slice designated with the BETG program takes the place of an older one; then this new slice can be tested immediately with the stringing program.

The Stringing Program
This program is used to string sound slices together--thus, to produce speech. From the menu of the program one can choose between manual or automatic (text-to-speech) stringing. The former is accessed by pressing "S" and the latter by pressing "T". First let us follow a manual stringing. This form is used primarily when we are studying the internal structure of sound linkages. After listening to the sound linkage we can, if necessary, insert additional sound slices into some slice sequence, or take slices out. So in general we use manual control in the course of development.

As the first step the program asks for the slice numbers. Every new code triplet goes into a new line. We designed the program so that the maximum number of 40 slices can be seen on the screen at once--in several columns. In addition to numbers the program accepts control characters, "F" for up, "L" for down, "J" for right and "B" for left, which move the cursor on the screen among the slice numbers. Naturally one cannot move out of the columns in any direction, but one can overwrite already entered code triplets at will. Corrections are stored in memory automatically. Full screen editing of the slice numbers is very easy. Additional control characters are "M" for modify and "T" for erase. Modification makes possible insertion of a new code triplet at the cursor position. If we have not typed in all three digits of the new slice number the program will not accept a new control character. With erase we can remove a slice number from the code sequence at the cursor position.

Stringing takes place as follows: We always reconstruct the name of the slice file from the next slice number in the sequence. After the file is loaded we copy the required slice to the end of the stringing work area. If the slice does not exist or if it is too long to fit into the work area the program stops the loading and sends a message to the user. If the user wants to go on working with the truncated string there is no obstacle to this. After completion of loading and stringing one can listen to or display the string. To do this the finished string must be copied to the display area.

Let us follow the automatic stringing branch! If we choose this branch then the routines performing the TTS transformation are loaded into memory from disk. Then we can type in any Hungarian text on the computer keyboard (see the baba, papa examples). A space and a carriage return indicate the end of the text. From this the TTS routines generate first a phoneme code chain and then a slice number sequence which we can play or further process with the stringing program

Directions for Further Development
With our program package one can already play Hungarian text with any content with understandable speech quality. But we must still do considerable refinement on vowel building rules and some sound slice data. We hope to do this refinement in the future in the conversational mode.

Our ultimate goal is the creation of a TTS system working on the LPC principle in which there will be not only good speech quality very similar to the tone of a human voice but also the possibility of changing the tone, emphasis and speed of the speech. We hope that as a result of our work there will be an LPC based talking machine which will surpass the previous TTS systems in intelligibility and naturalness.

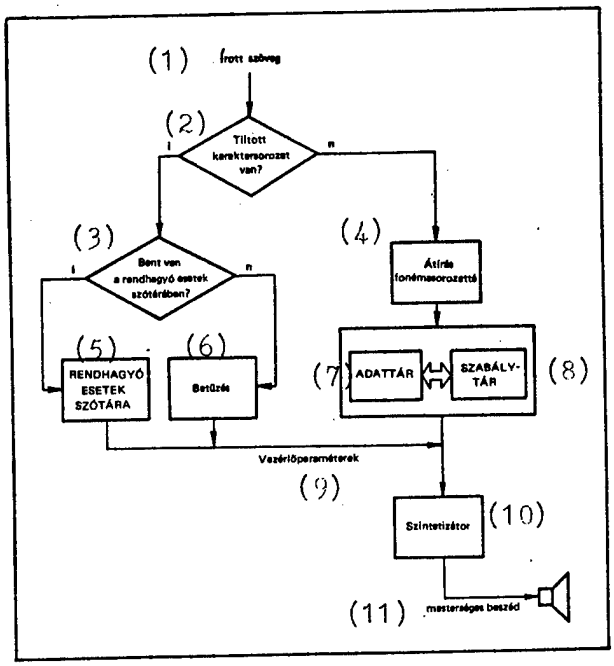

Figure 4. The Operation of TTS Systems

Key

1. Written text
2. Is there a forbidden character sequence?
3. Are the unusual cases in the dictionary?
4. Rewrite into phoneme sequence
5. Dictionary of unusual cases
6. Spelling
7. Database
8. Rules
9. Control parameters
10. Synthesizer
11. Artificial speech

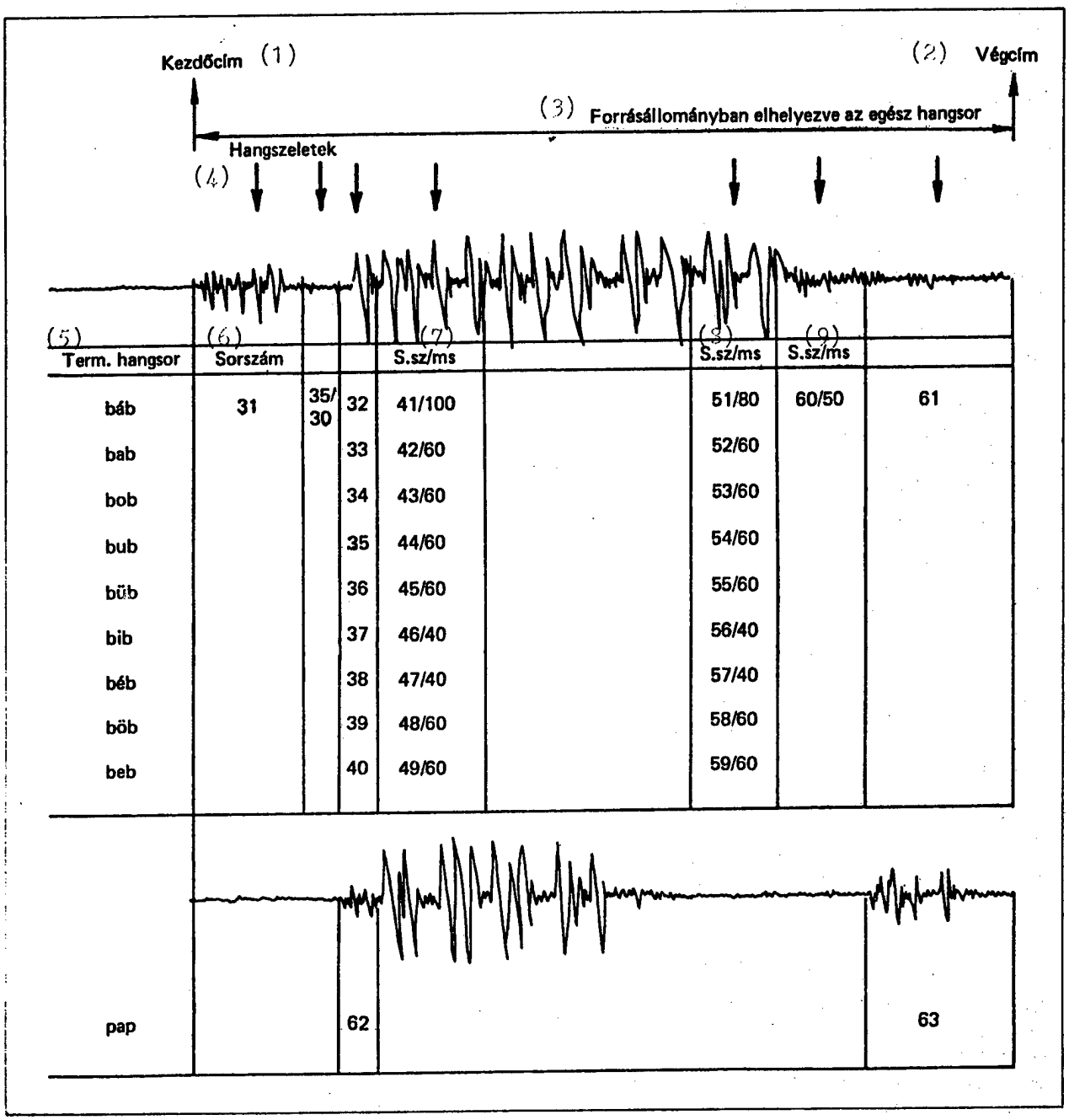

Figure 5.
Key

1. Beginning address 2. End address
3. Entire sound sequence placed in source file
4. Sound slices 5. Natural sound sequence 6. Serial number
7. Serial number/ms 8. Serial number/ms 9. Serial number/ms

8984
CSO: 2502/11

GOALS OF HUNGARIAN METERING TECHNOLOGY DEVELOPMENT ENTERPRISE

Budapest MERES ES AUTOMATIKA in Hungarian No 7, 1986 pp 249-250

[Article by Laszlo Pecsok, director of the MIKI Metering Technology Development Enterprise: "Developmental Directions of the MIKI Metering Technology Development Enterprise"]

[Text] The technical development enterprise reorganized from the Instrument Industry Research Institute (MIKI) as of 1 January 1983 entails a significant change in its new name and in its activity. This change did not begin in 1983 but can be traced to the beginning of the Fifth 5-Year Plan. In essence the new directions of activity were formulated then, but they developed fully by the beginning of the 1980's.

Both external and internal factors forced the significant changes which took place in the activity structure. By the beginning of the 1970's the R and D requirements--especially the product research and development done for other enterprises--had decreased significantly while there had been a great increase in the production of those instruments and devices needed by the market. These were the results of self-financed research and development and they provided a good living for the MIKI. In this period the directions of research and development became rather diversified; forces and assets were divided up among a large number of developmental organizations.

The R and D and production activity taking place in the institute had to be revised in a situation which was noteworthy from science policy, industrial policy and economic policy viewpoints and we developed a new developmental conception. The institute plan for the Fifth 5-Year Plan already contained a reduction in the ramifying R and D trends, internal organizational changes and the creation of R and D capacity ensuring a "critical mass." The external market conditions, the appearance of new domestic and international needs and the swift spread of computer technology and microelectronics in metering technology indicated the posting of new R and D directions.

The new profile of the MIKI developed by the beginning of the 1980's, containing the following chief directions:

1. Development of machine industry metering techniques, technology and automation.

2. Development of electronics industry metering automation and families of computer controlled automatic metering devices.

3. Development of telemechanical, control technology systems serving communal goals.

4. Development of highly complex, special purpose, computer controlled metering systems.

Naturally we decided on these longer range chief directions with a requirement that we might flexibly change the substructure within the chief directions along the way in accordance with needs. We felt that in this way we could provide sufficient freedom of movement to the MIKI and to those cultivating the chief R and D directions therein.

The experiences of the past period have proven that we defined the directions of our activity correctly from a number of viewpoints. During the few years which have passed the sales receipts for our activity have doubled. The next 5 years show a favorable prognosis.

Stepping out of the narrow instrument industry frameworks the MIKI is active, with no small success, in the broader area of metering technology and automation. We turned from the less intelligent custom instruments and automatic units to more complex, computer controlled, highly intelligent systems. With modularly designed systems we are capable of satisfying various user needs at a high technical level under favorable economic conditions with great reliability.

With a further development of the intellectual and production capacities which have developed and with an expansion of capabilities--which already represent a high level--we have moved to expand our activity to additional user areas, thus significantly expanding our activity in the direction of biotechnology, biological engineering, mechatronics, energy rationalization and environmental protection.

With a significant reduction of parallelism within our chief tasks, with the consistent use of uniformity and standardization and with the introduction of value analysis methods we plan to attain a significant efficiency improvement by 1990, meanwhile improving our market capabilities and extending our activity toward non-ruble accounting relationships.

Our experimental plant, grown to considerable size, aids the work of the large laboratories cultivating the chief trends; the further development, modernization and technologization of this is a task for the present period. With the putting into operation of an automatic designing system, with an appropriate organization of the manufacture of printed circuits and by raising quality control to a high level we have created conditions for modern experimental manufacture.

More and more our operations are becoming technical undertakings, in many cases complex undertakings. Our chief efforts include the realization and modernization of complex metering technology for plants and factories. Our assets are already suitable for very many types of solutions and we will expand them further in the years ahead.

The further development of the members of a sensor family measuring various physical parameters is continuing. The development of new elements and units has begun; these will become known as members of the mechatronics element and device family. We are continuing the development of new elements which will make possible the broad application of laser industrial metering equipment.

The further development of automatic metering devices will involve new flexible solutions--from simpler versions to the building up of complex systems--which are suitable for every use. In this way we intend to take a great step in the development of electronic metering technologies.

We also plan to expand the applications of our telemechanical and control technology systems. We are convinced that with a further development of the elements of the system we will be able to satisfy the increasing new needs.

With a further development of our highly complex special purpose metering systems it will be possible for us to gain and satisfy new markets. As a result of our R and D activity done in all the chief directions--in many cases as a by-product of it--we are also developing training systems which can be sold as an independent product family.

To conclude the thoughts voiced above it certainly should be noted that the intellectual value content of our activity done in the future will increase considerably, the capitalist import content of the equipment is already below the electronics industry average, and our economic efficiency is rising dynamically.

8984
CSO: 2502/8

AUTOMATED DESIGNING, PRODUCTION IN HUNGARY

Budapest MERES ES AUTOMATIKA in Hungarian No 7, 1986 pp 258-263

[Article by Dr Laszlo Scultety, deputy chief engineer at the MIKI Metering Technology Development Enterprise: "Questions of Automated Designing, Manufacture and Measurement." The first paragraph is the Hungarian language summary.]

[Excerpts] The article briefly summarizes questions of CADMAT (Computer Aided Design, Manufacturing and Testing) and CIM (Computer Integrated Manufacturing) systems, primarily from the viewpoint of metering technology and test automation. It describes the possible structure of the electronic factory of the future. Finally it describes the testing automation systems developed at the MIKI Metering Technology Development Enterprise which may serve as a basis for the realization of metering technology for an integrated manufacturing system.

Taking into consideration the results achieved in computer technology, robot technology and mechatronics the development of designing, manufacture and testing technology puts on the agenda in our country also the creation of integrated manufacturing systems.

Automatic Measuring Devices Developed at the MIKI Metering Technology Development Enterprise for the Electronics Industry

In the past period the MIKI has developed the following automatic testing devices on the basis of domestic needs and the needs of the socialist states:

--Selective level measuring automats, 100 Hz--2 MHz, -110 dBm + 10 dBm;
--Crystal testing automats, on the basis of the needs of the Soviet Crystal Physics Institute;
--Radio testing automats, for Videoton;
--TS102, TS105 and ICA 202 parts testing automats, for the VBKM [Electrical Equipment and Appliance Works];
--Testing of printed wired cards for TV sets, before and after mounting (in-circuit), for Orion.

One can see a photograph of the parts testing automats in Figure 3.

Development of the In-Circuit Testing Automat
The MIKI developed a very modern testing automat for the in-circuit testing of analog and digital printed cards after mounting (Figure 4). The testing system measures every passive part, analog and digital integrated circuit in isolation from other parts. Figure 5 shows the application of the analog guard technique and the digital backdriving method.

We give briefly below the data characterizing the system:

--Pin bed: 515 analog test pins; 480 digital or hybrid test pins;
--Measurement hardware: 1 K bit/pin D/S memory; DC, AC voltage and current source; DC, AC current measurement; AC impedance measurement;
--Computer: Elektronika 60 with 64 K bytes RAM; 10 M byte disk; 2 x 256 K bytes floppy disks; MDOS system;
--Software: program databank; analog and digital IC test program library; automatic test generation; scratch test.

Metering Technology for Integrated Circuit Manufacture
In past years the MIKI Metering Technology Development Enterprise has carried out significant developments in the area of developing a metering technology for integrated circuit manufacture. Figure 6 shows the metering technology task.

The characteristics of the metering technology are:

--measurements on a chip with a manipulator (chip classification);
--testing and classification of encapsulated circuits;
--continual statistical evaluation of the technology.

The following units were developed.

AIK I-II-III. Testing automats for consumer goods analog integrated circuits.

Measurement possibilities:

AIK I-II: DC voltage/current measurement; AC/DC conversion to 1 MHz; distortion/noise measurement; selective level measurement; TV signal form measurements; frequency/time measurement.

AIK-III: level/transmission measurement to 1 GHz; sensitivity measurement; frequency measurement; imedance measurement; AM/FM demodulation.

A photograph of the AIK-III testing automat can be seen in Figure 7.

Software characteristics: high level testing languages (EXT. BASIC, PASCAL, etc.); test program library; menu system; linking and editing of test programs; statistical program packages.

Test Structure Measurement Automats
The quality of the several technological phases can be classified by measuring test structures in the course of chip manufacture (Figure 8).

The following elements can be found within the test structures: resistor, diode, transistor and MOS capacitance.

The measurement possibilities of the measurement automat are the following:

--resistance measurement (2-4 wire): 1 ohm to 10 M ohm;
--leakage current: 100 pA to 10 mA;
--breakdown voltage: 0 to 200 V;
--transistor current amplification: 1 to 1,000.

In addition the measurement automat tests the voltage dependence of the MOS capacitance. We can see a typical diagram in Figure 9. Photographs of the measurement automats to study test structures can be seen in Figure 10.

Measurement Automats for A/D and D/A Converters
The measurement is done on the chip and on the encapsulated circuit. Measurement of fast D/A converters requires a special high frequency measurement technique with special test sockets with very short test wires. To test the converters we developed two types of measurement automats, using the static and dynamic measurement methods.

The Static Measurement Automat
Characteristics: 17 bit DC reference (10 ppm); measurement of 6-12 bit converters; measurement resolution 1/16 LSB.

Parameters measured: offset and end deviation measurement or setting on the basis of this; differential, integral nonlinearity; DC voltage/current measurement; input/output resistances; power supply suppression.

Dynamic Measurement Automat for the D/A Converter
Characteristics: sample measurement, 10 ps resolution; display, 100 ps/cm; computer processing.

Parameters measured: measurement of setting time to 1/2 LSB; fast D/A converter (6-8 bit), 10-30 ns; medium speed D/A converter, 0.5-2 micro s.

The AIK-IV Large Throughput Testing Network
In mass manufacture of integrated circuits it is very essential to have a large throughput capacity and a simple configuration possibility in the event of testing new integrated circuits. The AIK-IV testing network being developed at the MIKI satisfies this need. A block diagram can be seen in Figure 11.
Characteristics of the system: modular construction; simple configurability; expandable to 64 stations.

Computer and software characteristics: use of an Elektronika 60 with floppy disk and Winchester disk background; test program library; portable program development station; program editing with menu system; data transfer optimization.

The MIKI developed a local network called MIKINET to link the several measurement automats. The AIK-IV testing network can be used for parallel testing of parts coming in from several directions, to build up repair

networks (see Figure 2) and for other tasks in an integrated manufacturing system.

Summary
In the present article I tried to briefly sum up the problems of integrated electronic manufacturing systems and the results achieved in their development. I described the activity of the MIKI Metering Technology Development Enterprise with special regard to the results achieved in the area of measurement technology. I feel that the collective of our development enterprise has contributed significantly to the development of measurement techniques and metering technology in both the domestic and international area.

Biographic Note
Dr Laszlo Scultety has worked at the Instrument Industry Research Institute or the MIKI Metering Technology Development Enterprise since 1950; his present assignment is deputy chief engineer for technical development. Between 1950 and 1965 he dealt primarily with development of high frequency instruments and between 1965 and 1978 with with network theory and computerized designing. He defended his candidate's dissertation in 1975, the theme being optimization of active RC circuits. He has internationally recognized prestige in the area of active RC circuits, has given talks at a number of international conferences and has had numerous publications. Since 1978 he has been working in the area of computer aided designing and testing systems. He is a member of several Academy special committees.

For 15 years he was chairman of the Electronic Instruments Department of our association [Metering Technology and Automation Scientific Association] and is now associate chairman. Thus far he has organized the Electronic Instruments and Metering Technology Conference six times. His activity has been recognized by the Krusper Prize of the association. He is a regular speaker at IMEKO conferences.

8984
CSO: 2502/8

HUNGARIAN ROBOT DEVELOPMENT PROGRAM REVIEWED

Budapest MERES ES AUTOMATIKA in Hungarian No 8, 1986 pp 297-301

[Article by Dr Laszlo Helm, Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences (MTA SZTAKI): "Program for Development of Robot Technology"]

[Excerpts] The Domestic Situation: Our Backwardness is Significant Among the CEMA Countries

In our country we are taking the initial steps in the area of industrial robot technology. Despite the fact that attention was directed rather early, at the beginning of the 1970's, to the possibilities offered by the new technical branch already developing dynamically in the developed capitalist countries at that time and despite the fact that we took a few beginning steps in the direction of developing simpler pneumatic robots and starting their manufacture the development was slow and thus we remained behind countries at the same level of development which started on the path of robot technology at the same time or even later than we. Our initial steps were characterized by robot manufacture started on the existing technological base, by development connected with this and by experimental robot applications.

The Bakony Works, the Custom Machine Factory of the Csepel Works, the Precision Fittings Factory, United Incandescent (later the Gyongyos factory of the MEV [Microelectronics Enterprise]), MOFEM and Rekard took useful initiatives in the area of robot manufacture--partly by using state support from various sources--and started domestic manufacture of a few robot types.

Danuvia, the EMG [Electronic Measuring Instruments Factory], the Precision Fittings Factory, the IMI [Industrial Instruments Factory, Iklad], the MEV, the MIKI [Instrument Industry Research Institute], the MMG [Mechanical Measuring Instruments Factory], MTA SZTAKI, Tungsram and Vilati are conducting important background industry manufacture and related research and development activity in the area of developing and manufacturing subassemblies for robots.

The number of robots used at our domestic enterprises and institutes, mostly for experimental and partly for educational purposes, is about 50-60 units. These robots differ from one another in regard to their acquisition sources, technical level and use areas.

Among the friendly countries the Soviet Union has been working for several years already on the realization of a comprehensive robot development, manufacture and use program extending to many areas of the economy. The prescription is for the development and manufacture of 50 new industrial robot types, 17 types of new automatic (robotized) manufacturing lines and 50 types of robot supplementing peripherals between 1981 and 1990. Bulgaria also has a significant program, supported with central resources (manufacture of 3,500 robots of 15 types between 1981 and 1985), as do Czechoslovakia (manufacture of 4,000 robots of 18 types in the current 5-year plan period), Poland (manufacture of about 20 robot types) and the GDR (manufacture of 9,000 robots by 1985). These figures show that even in the 1981-85 plan period the governments of friendly states treated the development of industrial robot technology, one of the determining elements of flexible manufacturing systems, as a key question.

The Complex Development Program for Robot Technology

Satisfying the needs of a dynamically changing market increasingly posing custom demands in regard to products requires increasing the flexibility of existing manufacturing systems and broader use of flexible manufacturing systems in the area of new investments. The main types of robots which can be used in such manufacturing systems were developed in the past two decades; the conditions for many-sided use of robots have been created in general. With the experiences with model systems realized within the framework of the first robot applications competition announced in 1983 we went beyond the experimentation phase in our country too; the conditions were created on both the manufacturing and applications side for starting a comprehensive robot technology program.

The recently prepared state action program aimed at adopting the use and manufacture of robot technology and the G/6 program of the OKKFT [National Medium-Range Research and Development Plan] developed in harmony with it formulate the tasks for the complex development of domestic robot technology (subprogram No II). The goal of the subprogram, being realized with significant state support, is the solution of those research and development tasks which lay the foundations for the domestic spread of flexible automation of object handling and producing discrete manufacturing processes, the development of the mechanical-electronic devices needed to build such automated systems, the introduction of the use of manufacturing procedures and equipment suitable for the production of such devices, and with all this a modernization of machine industry products, increasing their exportability. A more distant goal is the development of plants and integrated manufacturing systems in direct contact with product and manufacturing planning work sites operating under reduced human supervision.

The subprogram is divided into three theme groups according to the chief tasks:

1. Robot research tasks,
2. Product and manufacturing development for robots, and
3. Robot applications.

The purpose of posting robot research tasks is partly to create the background necessary for adapting licenses, putting them into production and further developing them and partly to strengthen research of an applications character, which will expand the area of robot use and increase their intelligence level and adaptivity.

The goal of domestic robot manufacture development is to create conditions for broader use of industrial robots. The program will use central resources to support the manufacture of those robots which can be used in a broader sphere in the middle term to increase the flexibility of domestic industry and provide a "hard" exchange base on the socialist market.

The most important condition for domestic robot manufacture is organization of the background industry, manufacture in the required assortment and quality of the subsystems, units (mechanics, control and sensor systems, drives, etc.) and parts needed to make robots and of the peripherals needed for applications.

The production of robots and their subassemblies requires a high manufacturing culture and modern technical equipment. For this reason one of the significant goals of the subprogram is to aid the technological development necessary for robot manufacture.

The goal in spreading robot applications is modernization of technology, increasing its flexibility. The program will use central resources to support the creation of robotized technological systems (the so-called model systems) primarily in areas where one can count on an increase in convertible export or where robotization will foreseeably contribute to raising the general technological level of industrial production. An important subtask in this theme group is development of system design, robot programming and robot diagnostic methods.

In connection with all this we should note that the use of robots is central to the robot technology program now starting--as appears from how the theme groups are built on one another. By using robots which can be easily programmed for the current production the flexibility of a manufacturing system increases. The profit of robot use, going beyond the increase in the flexibility of a technology and the economic indexes which can be shown numerically in connection with their use (such as manpower savings, increased productivity, quality improvement), appears primarily in the fact that use of robots forces an organization of their environment (the related work processes) as required by the normal operation of a robot and according to experience this is worth many times more than the direct savings which can be attained--and shown numerically--by robot use.

Conditions for Implementation of the Program

The successful realization of the robot technology research and development tasks formulated in the G/6 program will require--in addition to material resources prescribed for support of the work and the R and D capacity already essentially available--the development of an infrastructure serving robot use

and the related robot manufacture and a broader teaching of the special information related to the area.

The infrastructure for robot technology includes the system design preparing for robot applications and the related special consulting (developing case studies to prepare decision making), the creation of an industrial robot database aiding selection of the industrial robots best suiting the applications requirements, prime contracting involving all the activity necessary for creating "turnkey" delivery of robot systems, the repair and services necessary to maintain the operability of robots installed, leasing which is less capital intensive for users and thus better suited to experimental needs, and quality testing interdependent with robot use and robot manufacture (development)--creation of a robot testing and classifying laboratory.

We should note that the development of computer aided design (CAD) methods and 3D modeling and graphic simulation have put new tools in the hands of designers of industrial robot systems. With these tools system designers have the possibility of spatial observation of the operation of the imagined system and thus of selection of a layout best suiting the practical needs. Despite the fact that such possibilities already exist on the market (e.g., the MODBUILD and ANIMATOR programs available in our country also) wider practical use of the new methods has not yet been realized.

Robot technology, embracing in a unique way the information of a number of scientific areas and developing extraordinarily dynamically, poses a many-sided task for professional education. On the one hand we must train or retrain experts to deal with the operation, programming, maintenance and repair of robots, experts dealing with system design, robot development and manufacture, in sufficient numbers at every level of technical education and on the other hand care must be taken for the further development of the knowledge of already trained experts in accordance with the rate of technical development.

The chief tasks are:

--development of uniform study materials building on one another level by level;

--preparation of instructors and creating organizational frameworks for instruction; and

--creation of study aids (notes, collections of examples, demonstration devices, robots and model systems for educational purposes, and robot testing laboratories).

The technical universities and colleges already engaged in teaching robot technology will have an important role in this work, all the more so since the intellectual capital and inventory of tools concentrated in these places for educational purposes provide a significant base for solving the research and development tasks formulated in the robot technology program.

On the basis of all this one can expect that implementation of the complex robot technology development program, starting from behind in comparison with other countries at a level of development similar to ours but posing realistic goals, will bring progress in the domestic adoption of one of the branches of developed technology. Cooperation with the CEMA countries will multiply our forces in this work. In December 1985 the fortyfirst extraordinary session of CEMA created the INTERROBOT international robot technology research and development association. Within this framework our country has an interest in development of measurement and testing robots, instrument industry assembly robots and certain products serving to complete robot technology. Realization of the goals of the program offers not only the technical-economic advantages accompanying the solution of concrete tasks but also will be a worthy contribution to the development of more demanding but more human work.

Biographic Note

Dr Laszlo Helm is a graduate mechanical engineer (Budapest Technical University, 1953) and a candidate in technical sciences (1968). His special area is measurement and control technology and within this primarily pneumatics, automated manufacturing systems and robot technology. He is the author of a number of professional books, some of which have appeared in foreign languages. Since 1980 he has been deputy first secretary of the MATE [Measurement Technology and Automation Scientific Association].

8984
CSO: 2502/12

TRAINING OF HUNGARIAN IC DESIGN ENGINEERS

Budapest HIRADASTECHNIKA in Hungarian No 6, 1986 pp 254-256

[Article by Dr Kalman Tarnay, Electronic Devices Faculty, Budapest Technical University: "Further Training of Design Engineers For Design and Application of Equipment Oriented Circuits"]

[Text] 1. Introduction
The role of equipment oriented circuits is of ever increasing significance in microelectronics. Today this technology is capable of creating harmony between the user and manufacturer of a microelectronic part:

1. it satisfies the special needs of the engineer designing the equipment, and

2. it ensures economical manufacture even in the case of a relatively small series.

The latter is in the interest of both the user and manufacturer of the part.

During the previous 5-year plan the industrial leadership made significant efforts in the interest of creating the technical, scientific, material and personnel conditions for domestic manufacture of equipment oriented circuits.

It is well known that from the technological viewpoint the manufacture of equipment oriented circuits does not really differ from the manufacture of the customary, so-called catalog circuits, but the design of them is different and requires a different view. Efficient design of equipment oriented circuits requires new methods of cooperation between engineers working in the microelectronic parts manufacturing industry and those working in the equipment manufacturing industry. The experience of the circuit design engineers in the microelectronics industry is primarily in the area of designing SSI, MSI and possibly the simplest LSI circuits; these are the circuits which have a broad use spectrum. The design engineers of the electronic equipment manufacturing industry (communication engineering, instruments and automation industry, etc.) have significant experience in the area of designing done with SSI, MSI and LSI catalog circuits, but without having more profound knowledge of the physical functioning of the circuit within the capsule.

At the initiative of the Government Commissioner for Microelectronics preparation for and organization of a course to train design engineers for the electronic equipment manufacturing industry began in 1982. Experts from the electronics industry, research and higher education and pedagogical experts participated in the preparatory work. Professor Almassy supported the preparatory work in his customarily active way.

Even in the preparatory period we had three courses (two organized by the Engineering Further Training Institute of the Budapest Technical University and one in the Communications Engineering Cooperative as an extension course). These courses offered significant aid in selecting suitable speakers, in harmonizing the study materials and in selecting themes and concepts which might be mastered with greater difficulty by designers accustomed to classical design.

In the course of the preparatory work we made the goals of the instruction more precise, debated and developed detailed thematics for the subjects to be taught, determined the weight of the several themes useful in the training and determined the degree of skill to be developed. A proposal was prepared for study aids. And we determined the method and volume for teaching computerized designing.

2. Chief Themes of the Further Training

We will list below by title the materials in the further training course. To facilitate mastering the material we prepared a textbook of about 1,000 pages and a 400 page collection of examples which contains test questions, exercises and element level and gate level circuit outlines for machine room exercises. We chose the extent and depth of the material in such a way that a significant part of it could be mastered by private study. The following listing is based on the chapters of the textbook. We also refer to the course activities connected to the several chapters.

1. Design and manufacture of integrated circuits (author, Andras Ribenyi), general review, clarification of the more important basic concepts. We intended this material as reading material.

2. Transistors (author, Dr Ferenc Masszi): Brief review of semiconductor physics, the Pn junction, MOS and bipolar transistors. Material intended for private study, we check that it is mastered with the aid of three tests.

3. Logic circuits (authors, Andras Asztalos, Peter Keresztes and Dr Vladimir Szekely): Discusses in detail inverters, gate circuits, multiplexer and decoder circuits and basic tipping cycles. The emphasis is on MOS circuits less known to participants in the course and touches only briefly on bipolar circuits. It constitutes one of the key themes of the course and consists of lectures, classroom exercises, a machine room exercise, three tests and practical home tasks.

4. Digital systems (authors, Dr Otto Szittya and Dr Andras Javor): The material deals with description and design of combination and sequential circuits, functional units and simulation of digital systems. It constitutes

the second key theme of the course and consists of lectures, classroom exercises, a machine room exercise, three tests and practical home tasks.

5. Specification of digital circuits and systems (author, Dr Gyula Csopaki): The theme is the description and use of hardware describing languages for equipment oriented circuits. The material is intended for private study; we check the mastering of it with the aid of a home task.

6. Testing of integrated circuits (author, Dr Peter Gartner): The material offers a review of functional test methods, designing for testability and the operating principle of automatic testing devices. The material is intended for private study; we check the mastering of it with the aid of a home task.

7. Technological foundations (authors, Dr Terez Kormany and Dr Gabor Ripka): Offers a review of silicon base materials, the more important steps in integrated circuit manufacture and the problems of encapsulation. The material is intended for private study; we check the mastering of it with a test.

8. Layout design I-II (authors of part I, Dr Pal Baji, Dr Gabor Farkas and Dr Andras Hegedus; authors of part II, Dr Mihaly Nemes and Piroska Szentpeteri): Describes design rules, together with their explanations, and cell and chip design. Acquaints the participants with graphic description languages. Discusses equipment used to produce masks. Part II describes primarily the design of circuits based on n-MOS and CMOS gate arrays, dealing in detail with the role, structure and use possibilities of cell libraries. It constitutes the third key theme of the course and consists of lectures, classroom exercises, a machine room exercise, several tests and practical home tasks.

9. Machine room aids (authors, Mrs Tibor Benko and Piroska Szentpeteri): Deals with a short description of computer design programs which can be used during machine room exercises and designing.

3. Requirements System and Instruction Methods

It seemed useful to make the course last one university semester (14 weeks) with two days of instruction per week of which one day consists of lectures and related classroom exercises and the other day is devoted to preparing test tasks, handing in and consulting on home tasks or machine room exercises. The program of this day is supplemented by viewing that part of 15 hours of video film preapred for the course which relates to the current material. Only part of the material will be the subject of a lecture, the participants must learn a significant part of it on their own. Successful completion of the course will require 150-200 hours of individual study or task solution activity during the time of study.

We tried to develop the requirements system in such a way that

--about 10 percent of the participants should be capable of designing equipment oriented circuits at the specialist level,

--about 20-30 percent of them should be capable of doing designing at a minimal level for microelectronics manufacturing-designing experts--primarily testing, and

--60-70 percent of them should reach a level where they are acquainted, with an appropriate foundation and degree of certainty, with the possibilities and limitations of equipment oriented circuits technology, thus becoming able to communicate effectively with microelectronics manufacturing experts.

Half way through the course we divided the participants into two groups on the basis of their achievements thus far:

The participants achieving the best results received a so-called large project to work on independently under the guidance of a consultant. The large project is to redesign a TTL-MSI circuit--usually one known to the designer--into a gate array type equipment oriented circuit. The large project to be submitted must contain the following:

1. Description and specifications of the redesigned circuit in the form of a catalog card;

2. A detailed block diagram;

3. Description of the circuit in a hardware description language;

4. Description of a study done with a logical simulation of the circuit and the results of the simulation (the simulation test must also be done after designing the layout--taking into consideration the corrected capacitive loads);

5. The layout plan (computer or manual);

6. Encapsulation and connection instructions; and, finally,

7. The test prescriptions for the designed circuit.

Successful completion of the large projects requires significant work not only from the student in the course but also from the consultant. We can also count it as an achievement if in this way a work connection which may be fruitful later develops between experts in the microelectronic parts manufacturing industry and the electronic equipment manufacturing industry.
There is a difference in the final exam in regard to those who do and those who do not prepare a large project:

--the final exam for those preparing a large project consists of defending the planned project; this is similar to defending a dissertation,

--those who do not prepare a large project take a test like a state examination on the three stressed subjects (MOS logic circuits, Digital systems, and Layout design).

The final exams are conducted before examination committees, and the examination committees include not only the examiners but also economic leaders and leading experts from the electronics industry. We have been able to use the examination experiences and the observations of the members of the committee in later courses.

4. Experiences With the Course

We mention below primarily data from the experiences which can be evaluated numerically.

Number of participants:

About 180 participated in the experimental courses held in 1982 and 1983; 82 persons started the course held in 1984 of whom 57 passed; 69 started in 1985 and 45 passed; this year the course started with 25 participants. Counting the experimental courses the total number of participants exceeds 300 persons. In the 1985 and 1986 courses 35 engineers prepared a large project. The great majority of the participants were engineers who had completed their studies in the past 10 years. The distribution of participants according to place of work gives an interesting picture; the most participants came from the following enterprises or institutions (our data are only from 1984; we have no data on the experimental courses; thus, for example, the Communications Engineering Cooperative, where we held an extension course with 34 participants, shows in these statistics a less advantageous picture than it would in reality):

Electronic Metering Instruments Factory	13 persons
Telecommunications Research Institute	11 persons
Medicor Works	8 persons
Microelectronics Enterprise	8 persons
Videoton	5 persons

There were only scattered participants from the large enterprises of the communications engineering industry. This is unfortunate, for our large enterprises also might effectively use in their smaller series products the gate array type circuits and the cell designed equipment oriented circuits in the large series products, and in addition to the economic results they could increase with new services the international competitiveness of their products.

Biographic Note

Dr Kalman Tarnay won his diploma at the Electrical Engineering School of the Budapest Technical University in 1952. In 1961 he defended his university doctoral thesis dealing with the theory of tunnel diodes. In 1967 he won a candidate's degree with a dissertation concerning the switching operation of field-effect devices. In 1983 he was made an honorary doctor of the Mathematics and Physics Section of the Uppsala University for his achievements in the area of modeling semiconductor devices. At present he is faculty leading docent at the Electronic Devices Faculty of the Budapest Technical University. He is chairman of the Semiconductor Devices and Integrated Circuits Department of the HTE [Communications Engineering Scientific Association] and a member of the Presidium of the HTE. He is a member of several Academy and MTESZ [Federation of Technical and Scientific Associations] committees.

8984
CSO: 2502/9

HUNGARIAN R&D ON MICROWAVE FERRITES

Budapest HIRADASTECHNIKA in Hungarian No 6, 1986 pp 262-267

[Article by Dr Szilard Marko, Telecommunications Research Institute: "Research and Development on Microwave Ferrites and Ferrite Devices." The first paragraph is the Hungarian language summary.]

[Excerpts] The article reports briefly on the research and development activity taking place at the Telecommunications Research Institute (TKI) in Hungary in the area of passive, nonreciprocal ferrite devices (isolators, circulators, gyromagnetic [YIG] filters, etc.) and microwave ferrite materials indispensable for modern microwave systems and equipment and on the testing of them, gives a brief history of this and describes the more important achievements and ideas for the future.

Introduction

In what follows we will briefly describe the results achieved at the Telecommunications Research Institute in the area of research and development on microwave ferrites and ferrite devices--needed for the systems developed at the institute--by selecting from among the achievements judged more interesting and significant those examples which give a picture of the many-sided nature of the research and development work, without trying to be complete.

Research and Development on Microwave Ferrite Materials

Device oriented materials research with industrial goals takes place at our institute. We want to develop, instead of a wide variety of materials, the special materials needed for the given devices.

Research on magnetic materials began in the first years of the founding of our institute. Our first achievement was solving the domestic production of powdered iron cores.

The first task of ferrite research was development and industrialization of high initial permeability ferrites. We developed transmission technology ferrites with initial permeabilities of 1100, 2000 and 3000 and industrialized their manufacture at the HAGY [Communications Engineering Materials Factory] in Vac.

We also developed, for the needs of Vilati and the Telephone Factory, several square hysteresis loop ferrite types which they used in their large equipment.

After 1957 our chief task was development of the ferrimagnetic materials needed for the large microwave equipment developed at the TKI.

Of the ferrite types needed for the microwave ferrite devices developed at our institute we again industrialized their production at the HAGY for those used in larger quantities while we produced in our laboratory the more sensitive types and those needed in smaller quantity.

In the beginning we developed spinel structure microwave ferrites, but today most of our devices use garnet structure ferrites--briefly, garnets--which contain three magnetic subsystems giving less dielectric loss and making possible temperature dependent compensation.

We developed 17 types out of polycrystal garnet material which we produce continuously in our laboratory according to need. The saturation magnetization of these is between 25 and 175 mT (250 and 1,750 G). Some types are characterized by temperature independence in the working temperature range; other types are outstanding for their low magnetic and dielectric loss.

We should make special mention of our garnet types developed as base sheet for microwave circuits. Here, in addition to proper magnetic and electric properties, an important requirement was a high degree of surface density and homogeneity.

Every step of production influences the homogeneity of the garnet material produced. On the basis of an experimental laboratory series we established that in presintered material a role can be played not only by mechanical inhomogeneity but also by chemical inhomogeneity, that is by the different chemical composition of individual crystal particles. In spinels which can be alloyed well with one another in different proportions the inhomogeneity is advantageous because of the greater reactivity but in garnets it makes impossible the appropriate homogeneity of the finished, sintered material.

As a result of our experiments pertaining to production of ferrimagnetic monocrystals we produced yttrium-garnet and and CaVaBi garnet monocrystals between 1750 and 200 G substituted with Ga and Sc ions. The world level quality of these corresponds to the requirements of the microwave filters and oscillators developed at the TKI.

We tracked the growth of the monocrystals with a study of their solution forms.

The ever increasing demands being made of materials necessitated work of a basic research type also.

We developed (together with the Budapest Technical University) a new study method for differential-thermo-gravimetry (DTGM) in a magnetic field which is substantially more sensitive than measurements used previously to show magnetic phases.

Evaluating the results of this study method with X-ray and infrared spectroscopic observations we were able to contribute to a description of the detailed course of the Y_2O_3-Fe_2O_3 garnet formation reaction.

In the course of our experiments we established that the loss of polycrystal gyromagnetic materials not only depends on chemical composition and morphological factors (density, crystal particle size, homogeneity) but also that it is significantly influenced by very slight changes in the iron ion content in the vicinity of the stoichiometric composition. We showed that for a garnet material of a given composition the maximum value of the delta H can be realized with a definite magnitude of the crystal lattice constant and crystal particle, or with the iron ion content related to these.

It is very difficult to follow with chemical analysis the extremely small difference in iron ion content or to measure the lattice constants and precise particle structure of the samples. Determining the Neel point with the DTG(M) method combined with a simple, optical microscope homogeneity study is suitable for recording the small differences in the iron ion content.

So it becomes possible to record the optimal iron content--which is determined in part by the magnetic properties desired and in part by the technological possibilities of production.

Higher requirements can be met by building in more kinds of substitutes. But the solid phase production of multiple component materials makes necessary a knowledge of the generation and transformation conditions of the intermediate products.

In the course of our reaction kinetics studies we observed what new, transitional products were produced by changing the ratio of ions involved and we measured the stability ranges of these intermediaries. These results--which in recent years we have presented at succeeding International Microwave Ferrite Conferences--make possible a refining of the production technology and the preparation of homogeneous materials with the desired composition.

Research and Development on Microwave Nonreciprocal Ferrite Devices
Research on microwave ferrite devices began at the TKI in 1957, only a few years later than in the most developed countries.

Device development took place practically in parallel with materials development, with great emphasis on the simultaneous development of fast classification methods for the materials.

In the beginning this double goal was best served by the Faraday rotation tubular waveguide layouts. Thus, we made the first tubular waveguide isolators and circulator layouts with Faraday rotators. But devices working on another principle soon forced the large and complicated Faraday rotation devices out in the area of tubular waveguide isolators and circulators for practical purposes.

Designs working on the resonant absorbtion and field displacement principles were for a long time competitors in the field of small output, telecommunications tubular waveguide isolators. In the beginning, due to the interfacing problems of the latter, the resonance isolator came to the fore but then the field displacement isolators overtook the best technical data in the world and the latter finally triumphed.

We successfully used the technique of variation computation for a good approximation of the field displacement isolator layout containing a ferrite body filling a large proportion of the cross section of the tubular waveguide, deriving a new vector variation formula which is valid even in the case of magnetically anisotropic mediums. Today, each year, we make several thousand field displacement isolators in the 3-26 GHz frequency range, with 0.2-0.5 dB forward direction and 20-30 dB backward attenuation, with 1.02-1.05 voltage standing wave ratios (FAHA).

For us also--as everywhere in the world--the three gate nodal circulators containing a gyromagnetic body placed at the "Y" meeting of the three waveguides have become dominant among circulators.

A significant practical achievement in eliminating the disturbing upper modes of tubular waveguide nodal circulators was a design developed on the basis of a theoretical study of modes--a design containing a thin metal sheet in the middle of the ferrite body, in the "H" level (see Figure 2).

We also make large quantities of tubular waveguide circulators to supply the Hungarian microwave engineering industry completely in the 0.1-0.5 dB forward 20-35 dB backward attenuation range with 1.04-1.2 FAHA.

Today the emphasis in research and development is on development of microstrip circulators and isolators realized with thin film technology which can be used in modern hybrid integrated circuit systems.

The formulas derived for computing Bosma strip line circulators offer a good starting point for approximate designing of these.

But these formulas do not take into consideration the effect of the dispersed fields--especially significant in microstrip layouts--and they approximate the effect of connecting lines very crudely.

We again used the variation technique to eliminate these disadvantages and make the computations more precise, and we got design equations showing very good agreement with the measurement results.

In the case of coaxial devices operating at lower frequencies (below 1-2 GHz) one gets too large a ferrite disk diameter and so the devices would be inconveniently large. So it is useful to use a concentrated parameter version in place of the distributed parameter solution. But realizing this, at the greater frequencies (above 2 GHz), is accompanied by increasing difficulties. So we developed a so-called quasi concentrated parameter method for operations in the transitional frequency band around 2 GHz. The essence of this method is that we use a ferrite disk with a much smaller diameter than the diameter

necessary for resonance according to the original formula and we provide the condition for resonance with a capacitive load--in general by using a dielectric with large relative permittivity.

We make concentrated parameter and microstrip circulators integratable and supplied with SMA couplers in boxed versions in frequency ranges from 100 MHz to 18 GHz. We make coaxial connection and (according to ever increasing demand) mountable isolators terminating at one of the gates of the circulator with technical data similar to the circulators, typically with 0.5 dB forward attenuation and backward attenuation above 20 dB with an FAHA around 1.2.

Photographs of 7 and 8 GHz mountable isolators and a boxed circulator can be seen in figures 3 and 4. In Figure 5 we can see the characteristic curves of an 8 GHz isolator.

In our newest developments we are dealing with so-called edge mode devices the operational basis for which is provided by a nonreciprocal field dispersion of the electromagnetic field--different in the two opposing wave propagation directions. The electromagnetic field propagating in a widening strip line, under appropiate conditions, concentrates along one edge of the strip line in the case of the wave going in one direction and along the other edge in the case of propagation in the other direction. By placing a loss medium along one edge we get a layout, an isolator, attenuating much in one direction and less in the other.

We can see a picture of such an isolator in Figure 6 and its characteristic curves in Figure 7.

Research and Development on Gyromagnetic (YIG) Filters and Oscillators
We developed at the institute a complete vertical technology for development and small series manufacture of YIG devices. In accordance with this the production, processing, classification and orientation of YIG monocrystals and research and development on YIG devices (filters, oscillators), their design and small series manufacture all take place here.

We have achieved the following results in the area of designing YIG filters and realizing the technologies needed to produce them:

We refined the microwave model for loop connected YIG filters. Figure 8 shows the gyrator equivalent circuit and further breakdown of it in the case of a two cycle filter. We supplemented this model with correction values characteristic of our design solution. The transmission curve and reflexion factor of the filter are strongly influenced by the impedances of the feed lines between the loops and the output and input gates, by the diameter of the wire used to make the loops, by the limit conditions pertaining to the radio frequency field surrounding the coupling system and by a correct selection of the gyromagnetic spherical diameter/loop diameter relationship. The value of the stop band attenuation (outside of the gyromagnetic resonance) can be varied between 30 and 80 dB as a function of the design, but this value can be significantly degraded by the magnetostatic modes. There are two types, frequency independent and frequency dependent, with so-called migrating modes. The former reduce stop band attenuation in discrete frequency ranges, the

latter significantly disturb the evenness of the pass band running down the resonance curve. We succeeded in reducing the amplitude of the modes with appropriate selection of the saturation magnetization value of the YIG spheres and by using so-called double connection loops.

We developed twice two cycle YIG filters which can be tuned in an octave frequency range of 0.5 GHz up to 12.4 GHz. The pass band attenuation of the filters is less than 4 dB and their stop band attenuation is more than 50 dB, the standing wave ratio is less than 2, and the level of the disturbing modes is lower than that of the pass band by 20-25 dB. The tuning steepness is 16 plus or minus 2 MHz/mA; the operating temperature range is - 10 degrees Celsius to + 65 degrees Celsius. The above parameters are equal to those of filters made for similar purposes by internationally recognized institutes. Figure 9 shows a picture of a YIG filter.

Research and development on and small unit manufacture of YIG tunable oscillators also take place in the institute. The parameters of the oscillators developed in the 0.9-2.1 GHz and 2-4 GHz frequency range are at the international level.

Filters, oscillators and delay lines containing YIG films represent the newest family of YIG devices. These devices make use of the surface magnetostatic waves arising in thin layer YIG films, or of the forward or backward propagating bulk magnetostatic waves. Significant research activity is taking place today in various laboratories around the world to produce devices with newer and better parameters. The devices will play a very significant role within a relatively short time, because their production technology is equivalent to microelectronic technologies, that is makes possible large series, high yield production.

At the institute we have begun research and developmental work on these devices which seem to have such prospects. The first circuit model experiments have taken place already.

Research and Development on Classifying Measurements on Gyromagnetic Materials
Simultaneous with development of gyromagnetic materials and devices at the institute we began developmental work on appropriate material parameter measurements. In the course of this work we developed and realized measurement systems and instruments most of which are in operation today with a precision corresponding to the international level. In the course of this developmental work it became possible to measure the parameters of polycrystal ferrite and garnet materials and YIG monocrystals which are important from the viewpoint of use.

We use a magnetic pendulum to measure saturation magnetization; with the aid of an electronic control and time measurement system the precision of this reaches that of the so-called Fohner type, vibrating sample magnetometer used internationally. With the aid of a built-in heating-cooling system it is also possible to measure the temperature dependence of saturation magnetization and the Curie point.

Measurement of magnetic properties, that is the resonance line width (delta H), the losses far from resonance and the related delta H_{eff} value for polycrystal materials; the resonance line width (delta H_o) and anisotropic constant (K_1/M_s) for monocrystals, and the dielectric properties is done in the microwave frequency range.

We realized measurement of the resonance line width of polycrystal materials on the basis of the IEC standard with a precision of better than plus or minus 5 percent.

We developed a semiautomatic measurement system in the 6 GHz frequency range to measure losses far from gyromagnetic resonance. Its precision is plus or minus 10 percent in regard to the delta H_{eff} value. A TE_{102} cavity resonator with a high quality factor and an automatic control system make the measurement suitably sensitive.

A measurement system realized in the X band makes possible measurement of the magnetic and dielectric parameters of garnet carriers of MIC circuits. We track with formulas based on exact solutions the changes in the parameters of a square cross section cavity resonator influenced by the sample, from which we can determine the parameters sought by successive approximations.

We measure dielectric properties with a relatively simple measuring system in the X band.

We use microwave test cavity square cross section and so-called "modified" perturbation formulas to compute the parameters from the measurement results.

The precision of the measurement is plus or minus 1.5 percent when measuring epsilon and plus or minus 15 percent when measuring tg delta, if tg delta is greater than 10^{-3}.

We are in the process of developing a highly sensitive system to measure epsilon and tg delta on the basis of the IEC recommendation, also in the X frequency band.

A so-called FMR measurement system developed at the institute and working in the 9 GHz frequency range is used to measure the resonance line width and anisotropic constante of garnet monocrystals.

The measurement system works with a shortcircuited measurement line and contains an approriate sample holding and sample rotating system. Its precision is plus or minus 10 percent, or plus or minus 4 A/m, when measuring resonance line width and plus or minus 5 percent when measuring the anisotropic constant.

The system also makes possible measurement and determination of the magnetoelastic constant.

In the future, in addition to improving the parameters of "traditional" ferrite devices and materials and extending the operational frequency range, we intend to deal with research on mm wave band devices and the hexagonal

structure microwave ferrites indispensable for them, with devices based on propagation of magnetostatic surface waves controlled by nonreciprocal and magnetic fields (phase shifters, filters, etc.) and with research and development on magneto-optic devices which can be used in optical communications.

An Expression of Thanks
The author wishes to express his thanks to Dr Mrs Laszlo Tardos for her help with the part on ferrite materials, Dr Istvan Csaba for his help with the part on YIG filters and materials measurements, Pal Gyuri for making available his as yet unpublished results achieved in the area of edge mode isolators and to many other colleagues for their research and development work in the area of ferrite devices and materials done for the institute.

Biographic Note
Dr Szilard Marko earned his degree in electrical engineering at the electrical engineering school of the Budapest Technical University in 1957. He won the degree of candidate in technical sciences in 1978. He was awarded the State Prize in 1980. He has worked at the Telecommunications Research Institute since 1957, his present assignment is scientific chief engineer. He has done his chief professional work in the area of research and development on gyromagnetic nonreciprocal devices. He is a member of the HTE, of the Lorand Eotvos Physics Society and of the International Program Committee of the International Microwave Ferrite Conference.

FIGURE CAPTIONS

2. p 264. Positioning of a metal sheet to filter out disturbing modes of a gyromagnetic prism with a triangular base.
3. p 265. Photographs of a 7 and 8 GHz mountable MIC isolator.
4. p 265. Photographs of a 7 and 8 GHz boxed MIC circulator.
5. p 265. Characteristic curves of an 8 GHz MIC isolator.
6. p 265. An edge mode isolator layout.
7. p 265. Characteristic curves of an edge mode isolator.
8. p 266. a. Loop connected YIG resonator equivalent circuit.
   b. Two cycle YIG filter equivalent circuit.
9. p 266. Picture of a YIG filter.

8984
CSO: 2502/9

NEW PRODUCTS OF HUNGARIAN ELECTRONIC MEASUREMENT DEVICES FACTORY

Budapest HIRADASTECHNIKA in Hungarian No 6, 1986 pp 282-284

[Article by Laszlo Csepe: "New Products of the Electronic Measurement Devices Factory"]

[Text] The Electronic Measurement Devices Factory (EMG) develops and manufactures electronic measurement devices and equipment needed for various measurements, tests, computations, regulation and control arising in the area of electronics and data processing and in the area of industry.

The products of the factory can be listed in four characteristic product groups: electronic measuring devices and systems, technological test equipment for the electronics industry, organization technology tools, and machine tool controls.

The first group contains the traditional electronic measurement devices--sine, pulse and function generators, oscilloscopes, modulation and distortion meters and multichannel analysers.

Among the instruments we should mention the 12 567 model programmable function generator, which provides function generator base signals in the 0.01 Hz-10 MHz frequency ranges (sine, triangular, square, pulse and saw tooth signals). The various start modes (TRIG, GATE, BURST, PLLxN, PLL÷N) and modulation modes (AM, FM, LIN/LOG SWEEP, VCO) provide a great deal of freedom to set the necessary signal forms. In the INT X-TAL REF mode it is possible to set frequencies with crystal precision. in the ARBITRARY mode it is possible to set optional signal forms, the signal form can be stored on and read back from magnetic tape, and one can play back the whole signal or any selected part of it. The built-in IEC 625 and RS 232C interfaces ensure complete remote control in all operating modes of the device.

The 79 815 model intelligent, microprocessor recording device records edited or computed figures, measurement results and functions as a graphics peripheral for computers, programmable calculators and electronic measurement systems. The character size and write image of the device, working on a surface which can be set to the A/3 paper size, can be programmed; it has pen change for two color drawing. High level parameter selection and drawing instructions aid its operation and use. It has a 2 K byte input buffer. The

resolution of the device is 0.1 mm; its dead zone is plus or minus 0.2 mm. The interfaces (IEC 625, RS 232C and parallel) aid connection to systems.

The 38 000 model multichannel analyser system is primarily a measuring device for nuclear physics, primarily to take and process gamma spectra. In addition it can be used well in all measurement processes where many data must be collected and processed with high speed, e.g. in neutron spectroscopy, X-ray spectroscopy, biophysics and certain areas of machine industry metrology. The device has an 8,192 channel data collection store and makes possible four channel pulse amplitude analysis or eight channel multiscaler operation. The data processing processor of the system has 64 K bytes of ROM and 64 K bytes of RAM and can be programmed in the BASIC language expanded with analyser specific instructions.

The second group is made up of technological test equipment for the electronics industry. This includes various semiconductor testing devices, semiconductor characteristic imagers, signal analysis devices and measurement systems.

The 19 680 model linear IC testing system is a test system for high speed, manifold, automatic measurement, classification and selection. Because of the large number of linear IC devices to be tested the great majority of the tests coming up in practice can be done with its aid. The test programs can be written in the interactive mode with the built-in keyboard with extraordinary simplicity but the device also has a number of factory loaded test programs. The test results appear on a large, easily read display but with the aid of built-in interface circuits they can also be documented with external equipment. A feeder can also be connected for series tests. The device sorts the tested integrated circuits into five quality classes.

The 19 700 model digital LSI, VLSI integrated circuit testing device is suitable for a "worst case" test, and for checking DC parameters and functional operation, of digital LSI integrated circuits with a maximum of 64 contacts, with a test speed of 5 MHz and 500 ps test time resolution. The ATLSI high level test oriented program language running under DOS makes simple program preparation possible for the user and makes it possible to run efficient self-checking and self-validating tests. When testing LSI memories the microprogrammed pattern processor produces internationally used signal samples. It is possible to test 256 K x 6 bits RAM and 64 K x 8 bits ROM, BROM, EPROM and EAROM. A special pattern processor ensures flexible checking of catalog LSI circuits, microprocessors, peripheral chips and user (custom, semi-custom) devices. With a standard interface surface and programs the test equipment can be fitted into CAD, CAT and CADMAT systems. The device can be used to test encapsulated circuits by connecting an automatic feeder and to test on the wafer with a wafer meter both for series tests by manufacturers of integrated circuits and to check incoming materials by users.

Among the characteristic imagers we should mention the 1577 model digital storage characteristic imaging and analysis system. This instrument has a completely new design; with digital mapping of analog signals (currents, voltages) it makes possible their storage for an unlimited time and makes possible various display modes thanks to various groupings of the stored data.

(For example, there could be the combined display of the characteristics of two or more devices in separate or common coordinate systems or the display of several characteristics one after another.) One can display a maximum of 16 curves on the screen at one time. It also contains an electronic tolerance test generator and network interference eliminator. One can do measurements up to 1,600 V, or 16 A, with the base unit and up to 1,000 A with the heavy current unit. It can handle the input, output and transfer characteristics of semiconductor devices.

The 19 690 model microprocessor logical state analyser tests micro and mini processor combination and sequential nets and bus systems. With its aid one can trace the operation of the systems studied; possible hardware and software errors can be easily found and eliminated. The device memorizes the desired section of the input pulse flow and displays it on the built-in display unit in mnemonic form or in a time diagram. Optional input units are available for the most popular microprocessors (8080, 8085, Z80, 8086).

The computer controlled 19 400 model in-circuit tester is an automatic testing device to check assembled printed circuit cards. In-circuit and limited functional tests can be done with the device. In the course of the in-circuit test one can check for shorts and breaks, missing or faultily or incorrectly mounted parts and for the operability of the integrated circuits. The results obtained for the part being tested are nearly independent of the other parts in the circuit; this is made possible by protecting circuits (guards) and pulse measurement (backdriving). Depending on how it is assembled one can test a maximum of 1,024 analog, 960 digital or 480 hybrid plus 32 analog test points; the maximum card size is 330 x 432 mm. The test is done with the aid of a pin bed in a pneumatic receiver. The device produces the test programs automatically while self-check programs check its own operation. Use of the device greatly reduces the test and repair time needed for assembled printed circuit cards, reducing the cost and the expenditure of live work.

Applications of the equipment in the third group extend to mechanization of engineering work and uses in administrative processes.

The 777 D model programmable graphics computer is suitable for technical-scientific computations, control of measurement systems, medium size data processing and--with the graphics expansion--two dimensional graphics tasks connected with the foregoing and for depicting functions. The device contains a bit sliced microprogrammed main processor (AM 2901) and three INTEL 8085 peripheral processors. The built-in peripherals are a 31 cm alphanumeric-graphics display tube and two measurement system interfaces. A typewriter keyboard and a wide alphanumeric graphics printer can be connected by separate cables. The programming language for the device is extended BASIC. The chief directions for expansion are file handling, instructions supporting measurement system control, graphics instructions, matrix handling, string handling and an expanded function and instruction set.

The HUNOR microprocessor controls providing 2 to 5 axis, 0.01 to 0.001 mm precision, depending on model, are suitable for control of machine tools provided with direct current or asynchronous advancing servomotor drives. Their fundamental property is easy programmability by hand from a keyboard.

The controls used for the several machine types (lathe, milling machine, grinder, edge bender, miniature processing center, etc.), the built-in machine oriented fixed cycles, the geometric computations and track and tool corrections greatly facilitate use of the control and their services adapt to the technological needs of the basic machine. The built-in indicator, the display which can be connected and the programs which can be read from punch tape, tape recorder or program preparation unit provide flexibility of control.

8984
CSO: 2502/9

TABLE OF CONTENTS OF HUNGARIAN ELECTRONICS JOURNAL

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 pp 2-3

On Our Cover

On our cover are the R 550 surface mountable resistors of Remix. The small (1.6 x 3.2 mm^2) resistors are made for the most modern parts seating technology, surface mounting. The equipment at Remix on which these resistors can be used is part of a "model" manufacturing line. On it they hope to show users the advantages of the technology and the use of the new type parts. In addition to the demonstration they are undertaking for equipment manufacturers installation, training and other services connected with introduction of surface mounting.

Parts

In our Parts column we publish an article by two recent graduates of the technical university. A conference of this year's graduates was held at the Budapest Technical University on 21 March; from it we selected a few papers, providing publication possibilities for the young people. Andras Papp and Laszlo Zsoldos demonstrated the design of a peripheral circuit for the 280 microprocessor. The circuit based on CMOS base cells is a nice example of cell library designing. The circuit consists of serial I/O channels and clock distributers so its use possibilities are rather general, suitable for serving terminals, printers and tape recorders.

In his article Otto Szentjobi deals with model simulation of an already existing cell processor. His work is interesting not so much for the solution to the given task but rather for the little summary in the introductory part of the work. One goes from an outline of cell automats through a cell processor model to the description of the simulation. This cross section--it is hoped--will arouse the interest of readers in this theme, one with great domestic traditions.

Devices

A work by graduating student Istvan Gal appears in our Devices column. The task of the student was to design and build a network frequency vector ratio meter. After his exposition of the problem the author analyzes the difficulties in solving the task and then describes the solution he proposed. The key to the solution is use of a suitable filter stage; he uses fifth degree Cauper and passive LC filters. The device can be battery operated also, which makes possible measurements on high voltage common signals.

Telephone

The article by Sandor Mazgon, Gabor Huszti and Gyorgy Rajkai got left out of our previous issue because it arrived late. This is no problem because now we can deal with problems which can be grouped around the telephone theme (as we hope to do in the future). "The ISDN as a New Concept" poses many problems. (Even the name is problematic, in our previous issue we used the Hungarianized ISDH [substituting "halozat" for "network"] but a number of people have convinced us that use of the internationally accepted ISDN is more correct.) The authors, from the PKI [Postal Experimental Institute], briefly summarize the essence of ISDN and then describe those proposals which constitute the foundation for Hungarian developments now getting started.

Control Technology

According to their article Istvan Morocz and Zoltan Barati are using a microcomputer as a tool in engineering design work. The modeling of control technology signal transmission offers aid to the design of such systems. The chief merit of the two part article is that it describes a method which makes it easy to solve previously difficult, or theoretically impossible, tasks.

Panorama

In the course of reader surveys very many note the absence of descriptions of new parts and circuits. Readers perusing Western journals are accustomed to and naturally demand these descriptions. Our task is a bit more difficult than that of the editors of a large American journal, because of the substantially more restricted status of domestic development. Despite all this we are trying to satisfy--at least in part--the demand. For this reason we are publishing in the Hungarian language the microprocessor catalog of one of the large journals. We hope that this will be good for orientation, if for nothing else.

[Eight and a half pages, "to be continued," are selected from the EDN catalog, EDN, 28 Nov 1985, pp 107-198, for the above item.]

8984
CSO: 2502/7

HUNGARIAN STUDENTS DESIGN Z80 PERIPHERAL CIRCUIT FOR CUSTOM IC'S

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 p 14

[Article by Andras Papp and Laszlo Zsoldos, graduating electrical engineering students, Budapest Technical University: "Design of a Z80 Peripheral Circuit for Equipment Oriented Circuits"]

[Excerpt] Introduction
At least half of the computers in Hungary work with the Z80 microprocessor. They are used not only in personal computers but also have an ever increasing role in control of industrial processes.

Microprocessors must make contact with the external world to be able to receive data and measurement results or send to the appropriate place the values obtained in the course of their work. They use data input and output units for the necessary data traffic. These can be serial or parallel channels (Z80 SIO or Z80 PIO).

They use serial lines to control terminals (a maximum of 9,600 b/s), printers and plotters (generally 300 b/s) and industrial processes. In these cases the data transmission channels work almost exclusively in the asynchronous mode.

The Z80 SIO has very many and rather complex services, such as fast data transmission (100 kb/s), a synchronous mode, quadruple buffering, and so forth. But in the majority of cases only the slow asynchronous transmission is used. Those parts of the circuit which make construction of the Z80 SIO complicated remain unused. Not too many logic elements are needed to build a serial channel capable of only slow asynchronous data traffic. In addition, double buffering instead of quadruple buffering is enough because of the slow data transmission.

In the course of designing a microprocessor there is frequently a need to count the pulses coming from outside or to generate a frequency lower than the microprocessor clock signal. In Z80 systems this task is taken care of by a counting-timing unit (Z80 CTC).

This function is realized by a not too complex circuit, considering that one can find in both units logic which provides the link to the Z80 system making

it possible to link into the chained priority interrupt without any additional external circuit.

At the MEV [Microelectronics Enterprise] they are now developing a CMOS cell matrix in which one can realize about 800 two-input NOR functions. It appears that on this one could realize a Z80 circuit which would be capable of slow serial asynchronous data transmission and the counter-timing tasks. In addition it could be linked into the Z80 interrupt system.

We could build into one capsule the functions originally requiring two. Thus we could reduce by half the price of the IC and the room and time needed to build it in.

The Course of the Designing

According to our original thinking we imagined four channels which could be programmed independently of one another which could provide, as one wished, serial input and output or the counting-timing function. We also thought of designing in a one-channel PIO, but the number of pins available (40) proved too few for this. So we had to give up the PIO.

Such a system design can be realized as a single design without anything further. In the interest of swifter introduction we realized one part of the system design as a first step, using the CMOS cell matrix under development by the MEV. According to the thinking the circuit will contain logic elements equivalent to about 800 two-input gates.

The planned circuit will contain two serial input and output channels, independent of one another, and two counting-timing units, also independent of one another. It will have chained serial priority logic, which will make possible automatic, vector interruption without having to use any additional outside circuit for that. In the priority chain within the circuit the two SIO channels have priority. The circuit requires +5V power voltage and a single phase clock signal. The channels are placed at continuous addresses. There is need for one each writeable command registers for programming the several channels. The readable registers are the state and buffer register of the SIO's, and the current state and downward counting value of the counter-timers. So out of a total of 12 registers 8 are writeable and 8 are readable.

For the above listed functions we did not use all the pins available (40), so we used the remaining four to lead out a general IT signal for each channel. Thus the circuit can communicate not only with Z80 systems.

We did not entirely reject our original thinking about the four general channels (SIO-CTC), however, because these functions can be realized in custom designing.

8984
CSO: 2502/7

HYBRID IC MANUFACTURING PLANT OF HUNGARIAN REMIX ENTERPRISE

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986, insert following p 60

[A 3 page insert prepared by Bela Laczko, with 11 color photographs by Laszlo Rakoskerti: "The Hybrid Integrated Circuit Manufacturing Plant of Remix"]

[Text] We have reported earlier in the columns of our journal about the achievements of the domestic development of microelectronics. Our color report now guides our readers through the new plant of Remix.

The plant is suitable for large series manufacture of thick film integrated circuits. The bulk of the technology and equipment was delivered by a French gentleman within the framework of a license and know-how contract. The investment provides a foundation for domestic manufacture of equipment oriented hybrid circuits, makes possible mass manufacture of power circuits and, last but not least, mass manufacture of surface mountable chip resistors. Let us wander through the technology at the plant!

Manufacture begins with preparatory operations. First they classify and prepare the pastes from which they print the resistor and conducting networks and dielectric layer. They clean the carriers (50 x 50 mm ceramic blanks) and put them in a store. Printing and forwarding on the belt taking them to the drying stove are automatic, then the blanks are again put into a store automatically. Combining the printing and drying equipment increases productivity.

The resistors are printed onto the dry conducting network--on the same equipment as before. Because of the relatively narrow resistance domain of the pastes and the broad value limits of the designers it is necessary to use two, three or even four resistor pastes.

The dry networks must be burned in. Burning means that the solvent vapors and the organic material content of the pastes must be removed, developing the metal structure. The operation requires a high precision tunnel furnace with many heat zones (6-8) in which the gas atmosphere as well as the heat profile must be set precisely. The high production, modern equipment of Remix satisfies these requirements to the maximum degree. Since the conducting network, insulating layers and resistor layers must be burned in separately it

is appropriate to do these operations in separate equipment; this increases the utilization of this large equipment.

The resistor networks obtained by burning in meet the values prescribed by the designer with a precision of only plus or minus 20 percent. The precise values (within a suitable, also prescribed tolerance) must be set subsequently with an operation called "trimming". The most modern tool for this is a laser value setter. The equipment which can be seen in operation is computer controlled (programmable simply in BASIC) two pin or multiple pin equipment. In the two pin version the pins pass over the resistors according to the program and the laser beam sets the resistance values. In the multiple pin version pins are connected to both ends of each resistor and the value setting begins then. Naturally the latter method is quicker. The most developed version of value setting is active trimming where the resistances of the connected circuit can be set "in operation" with continual measurement of the characteristics of the circuit. At the time of our visit this equipment was being set up.

In general no single circuit is made on one ceramic blank. It is possible to cut the blanks to size in advance but it is also possible to break them up subsequently. The laser cutting machine is computer controlled, very modern equipment operating with a 100 W CO_2 laser the use of which results primarily in saving foreign exchange. (One need not order pre-cutting from the ceramic blank manufacturer.)

The finished resistor networks will become hybrid circuits by seating active elements--diodes, transistors, integrated circuits--in them. We call these operations assembly. At present we can see at the plant both traditional manual assembly and the most modern automatic surface mounting. It is worth looking at this more closely.

Surface mountable parts (SMD) are characterized by the fact that their leads are prefabricated in such a way that mounted on the tinned conducting network (special adhesives are not needed for this in the case of hybrid circuits, the flux material of the tin paste holds the part) they can be soldered in immediately with reflow soldering. The technology has multiple advantages--the SMD devices are small and the technology can be automated to a high degree.

The experts at Remix obtained significant experience in SMD technology in the course of manufacturing hybrid circuits. Now they want to use this knowledge in printed circuit technology. The already operating special automatic equipment serves this purpose and will serve as a basis for the experimental plant of the future. In principle the equipment is capable of an output of 4,000 parts per hour (in practice this decreases to 3,000 per hour because of differences in parts) and is capable of seating 210 types of small parts and about 100 types of SO capsule IC's. Technological installation is now under way, but the soldering equipment for the full technological line is still missing and testing is not yet solved.

After this brief detour let us look at the testing of the finished hybrid circuits. Most circuits are tested by using special purpose equipment and universal instruments. Within the framework of reconstruction they put into operation one low frequency (DC-1 MHz) and one high frequency (100 kHz-1 GHz) computer controlled automatic testing device. There is still need for considerable development in this area.

HUNGARIAN PLANS FOR LOCAL NETWORKS, CUSTOM CIRCUITS, DISK STORES

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 pp 61-62

[Unsigned article in Professional Policy section: "Report on Development Themes"]

[Text] The Council of Ministers has adopted the "Central Economic Development and Organization Program for the Spread of the Social-Economic Use of Electronics" (EGP) which deals with the chief goals, emphasized tasks and conditions, tools and methods for realization. The EGP embraces the Seventh 5-Year Plan and the additional decade until the turn of the century.

Because of the unique nature of the EGP it differs in a number or respects from earlier central development programs. Since the program wants to encourage the deliberate use of electronics and create conditions for this within the state sphere, working it out requires a unique approach so that its effect will appear at the level of industrial, agricultural and service organizations and at the level of state administrative and research institutions. For this reason the program designates developmental goals only in some areas. Implementation of the entire program is left to the decisions of state organs, managing organizations and individuals as influenced by the system of tools in the program (economic regulators, technical coordination, etc.).

According to the resolution of the Council of Ministers the OMFB [National Technical Development Committee] must see to the central tasks of the EGP pertaining to electronification. In what follows we describe a few themes already under way which are organized, guided and supported by the OMFB.

Use of Computerized Local Networks

Local networks can be regarded as a class of computer networks, but reducing the extent of the network promises the creation and use of qualitatively new technical, applications and technological possibilities compared to what we are used to. The high speed, relatively cheap local transmission (1-50 Mb/s) and linking a high number of work site computers (40-1,000) with distributed tasks into a system make possible the computerized integration of the activity of an entire office, plant or department store.

The theme of local networks far exceeds questions of preparing and constructing the network and developing and programming the network tools.

It extends also to an analysis of those organizational, conditions and technological questions by virtue of which one can realize the useful and economical operation of a network system. The possibility of direct information query and transmission and the large scale bypassing of collateral paper documentation requires reorganization, because the transmittal dead time and supplementary paper work of traditional systems substantially shifted the optimums of human and machine work schedules. In local networks, on the other hand, the distant reserves must be organized in a different way similar to the experiences of flexible manufacturing systems.

Building local networks can be regarded as a computer technology and communications task only in part; at least as important are the applications technique, organizational, psychological and sociological factors. One can attain the expected success--more flexible and more economical activity at a substantially higher level and with quicker throughput--only if one has acquired this system building practice through one's own experiments.

We cannot count on substantial import from countries with a developed computer technology culture when creating local networks. The CEMA market will represent much more of a sales possibility than an acquisition possibility in the foreseeable future also. But the domestic computer technology culture--with the exception of critical background stores and possibly some electronic parts--is able to solve every essential task of local networks and will be capable of delivering not only tools but systems as well.

The best way to encourage developments seemed to be to announce a competition in which one could realize other viewpoints as well as the chief goal. Non-technical questions (e.g., social aspects) could be studied outside of or in the wake of the competition.

When specifying the subject the competition announcement puts the emphasis on putting the development to use. The applications system must be aimed at solving the given task, together with the hardware and software tools. The announcement sets the minimal structure. Six months of operation are necessary for well founded evaluation.

In the judgment the advantage will be given to solutions which can be widely used.

The solution must be based on existing domestic development achievements.

The OMFB will provide support for accepted entries up to 60 percent of the technical development costs. The total support is 42 million forints. Since we are talking about applications one can sign contracts for the developments with other enterprises to the burden of the prescribed cost frameworks.

Fourteen works were submitted. The expert committee--following a point evaluation method worked out earlier--accepted three entries first, since each of these reached 75 percent of the maximum 100 points (the Danube Iron Works,

the Central Physics Research Institute and the Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences). The sums needed by the entries came to 28.5 million forints, so it was possible to accept an additional three entries (the Gyor Electric Industry Cooperative, the Szabolcs County Construction Industry Enterprise and the Budapest Tetenyi Street Hospital).

The committee found other entries suitable for enjoying support from their supervisory organs.

Designing Equipment Oriented Circuits and Developing and Installing at an Enterprise So-Called Finishing Technological Lines

Equipment oriented circuits can be made of highly integrated microelectronic unit circuits; for this one must develop the designing, electronic and mechanical technologies.

Today manufacture of the base circuits can be done in Hungary only at the Microelectronics Enterprise. But the elements must be formed into complex circuits. An equipment manufacturing enterprise supplied with specialized technological lines for it can take care of this relatively undemanding finishing technology. Thus the mass manufacture of the rasters of uniform elements can be fitted to the production of equipment in small series.

Following development by the KFKI [Central Physics Research Institute] the facility prescribed in the Central Electronics Development Program should be established at Videoton--as a model plant. The machine inventory and the know-how of the KFKI do not exceed half of the investment or 20 percent of the capitalist foreign exchange requirement for a customary integrated circuit manufacturing plant.

The OMFB has offered Videoton 39 million forints support, half of it in capitalist foreign exchange, for the development which will total 72 million forints.

Development of Large Capacity Magnetic Disk Stores

Large capacity magnetic disk Winchester stores--up to 20 M bytes--are critical points for the spread of computer technology culture. The OMFB and the KFKI have signed a contract for the development of them and for building working models of them. The relatively expensive R and D work will become generally profitable economically when some manufacturing enterprise becomes involved in concrete industrial production.

As a first step they are building at the KFKI a high purity shop which will be the first in our country suitable for development of computer peripherals representing peak technologies and for mechatronic research and development. The KFKI will have ALUTERV [the Aluminum Industry Designing Institute] perform the experiments on the aluminum base material for the magnetic disks and to develop the technology.

The success of the work will require close coordination, primarily between researchers and the future industrial enterprise. The industrial enterprise must do the technological development almost parallel in time so that the research results can be taken over without delay. The state administrative organs--the Ministry of Industry and the OMFB--must ensure coordination. According to the preliminary thinking the research must be completed in 1987 so that the zero series can start in 1988.

Taking into consideration the expenditures of the industrial enterprise the costs can be put at 130 million forints, of which 80 million forints can be turned to the work of the KFKI. The contribution of the OMFB is 70 million forints, made available largely as capitalist foreign exchange.

Starting Experimental Teledata Service, Extending It to Leading Organs of State Administration as an Operational Test

For several years OMFB studies have pointed out the utility of Teledata (videotex) services. Operation of the services can be based on experimental applications. The Communications Engineering Electronics Institute of the Budapest Technical University developed such an experimental system in cooperation with the Hungarian Post Office and the Orion Radio and Electric Enterprise.

Then the idea arose of creating a Teledata network to inform the supreme leadership. Creating such a service--at first for experimental purposes--is the task of the KSH [Central Statistics Office].

After the OMFB had a substantive and operational model of the planned service worked out a contract to continue the work was signed between the Computer Center of the KSH and the OMFB. For a long time the problem with designing Teledata was that there was no proven technical background with which to test the content and operation of the system.

In any case it came time to replace one of the computers at the KSH. This involved an IBM minicomputer, together with its software, which was the base machine for a Bildschirmtext service operated at the FRG Post Office. With some expansion this machine can be made suitable for the Teledata experiment.

The financial support of the OMFB is aimed at the expansions, including the supplementary equipment to be obtained from the Orion enterprise. Subsequently the foreign exchange support by the OMFB was changed in that the KSH can cover the entire IBM order from its own sources so the OMFB support will be turned to the equipment to be obtained in the second phase aimed at the Teledata service. The OMFB support comes to 28,000 dollars and 1.4 million forints.

8984
CSO: 2502/7

HUNGARIAN ELECTRONIFICATION PROGRAM

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 pp 63-65

[Article by S. A. and P. H.: "The Electronification Program"]

[Text] At the end of last year the Council of Ministers approved the Central Economic Development Program for the Spread of the Social-Economic Use of Electronics, which we call simply the EGP, with resolution 2024/1985 MT concerning implementation of the law concerning the Seventh 5-Year Plan for the national economy. Our journal has been dealing with the program for a year already but we have found that our readers know little about the details, not to speak of the fact that it is not easy even for experts to orient themselves in the jungle of various other programs affecting electronics. For this reason we will try to outline the structure and chief substantive import of the EGP and related programs.

The Goal of the Program

In our country also electronification is an objective process which is affected by many factors such as the accessibility of tools, the preparation of the experts and receiving environment, interest relationships and state conditions for use.

The goal of the EGP is to accelerate economic development and technical progress. In addition to the production side we must emphasize such effects as the quality of services, products and work performance, improving the work culture, organization and the efficiency of guidance, developing the infrastructure and with all this the social aspects of the process and creating the conditions.

The program sums up the state measures and economic guidance tasks for the social-economic spread of electronics. Thus it does not deal primarily with industrial-production tasks but rather is intended to encourage use and applications, primarily within the framework of state organization, and to create the state conditions for this.

Inter-Branch Target Programs

Inter-branch subprograms have been prepared within the framework of the EGP in emphasized areas for developments belonging in the central sphere of authority; these subprograms embrace some of the most important infrastructural tasks for electronification. These are:

1. An inter-branch subprogram for the development of telecommunications;

2. The Seventh 5-Year Plan tasks and conditions in state administration for developing informatics and computer technology applications;

3. A program for the development of electronification training and retraining; and

4. The computer technology, communications and automation R and D tasks for electronifiction.

The last subprogram is identical with the program of the OKKFT [National Medium-Range Research and Development Plan] designated G-1. On the basis of experiences with similar programs of the previous 5-year plan the G-1 program contains in abridged fashion the R and D goals of the three great electronics areas. But despite this integration it cannot embrace all the research and development activity for electronification.

The OKKFT G-1 program consists of four subprograms which are divided into theme groups, themes, task groups and tasks. The four subprograms are the following:

I. Future computer technology and automation devices and systems;

II. Communications systems;

III. Applications of computer technology, automation and telecommunications systems; and

IV. The foundation research needed for a wide spread of electronification.

It should be noted that within the framework of the OKKFT program the G-5 program (R and D tasks for electronic parts and subassemblies) and the G-6 program (R and D tasks for manufacturing automation, precision engineering devices connected with electronics and their production) and the ministry level research target programs of the OMFB [National Technical Development Committee] and the Ministry of Industry are closely linked with electronification.

Branch Electronification and Informatics Subprograms

On the basis of a resolution of the State Plan Committee 19 ministries, organs with national authority or interest representation organs have worked out branch electronification and informatics conceptions. The branch subprograms--harmonized with the inter-branch ones--put forward goals for development of branch information systems, electronics infrastructural developments and guidance and institutional enterprise electronification; in part they have

prepared their action programs and have surveyed, in general terms, the need for assets and resources.

The Electronic Equipment Manufacturing Industry

Those working out the EGP frequently noted--and this is obvious from the foregoing--that the EGP is not a program for the electronics industry, but the two are inseparable from one another. A basic condition for realization of the EGP is a rich supply of equipment and systems which can be used. According to the thinking in the seventh 5-year plan for the industry, supply and demand can be brought into harmony from the quantitative viewpoint. As a result of the planned development of the electronics industry, exceeding that of the machine industry, it will be possible to significantly improve the efficiency indexes of the equipment manufacturing industry, introduce modern manufacturing technologies on a broad scale and realize a significant structural change in which there will be a swift increase in the software component linked to products, in engineering activity and in the training and service functions.

It is worthwhile for us to note that the present classification system distinguishes seven manufacturing branches which make electronic equipment. The development of electronics has made it timely to talk about a uniform electronics industry in the guidance, planning and monitoring system.

In addition to the R and D tasks of the electronics industry the most important ministry level R and D programs are:

--computer aided engineering designing systems, and
--R and D tasks for the electronification of agriculture.

A number of other R and D programs are being worked out as well.

The System of Tools Serving Realization and Other Factors Connected With The Program

A number of factors affect realization of the program, including cooperative projects, general measures and regulations. One must also take into consideration a number of economic and social effects and requirements produced by realizing the program. These need to be considered and the program does deal with the chief questions. We will only list them now:

--International scientific cooperation;
--Preferences, removal of regulatory elements hindering the spread of electronics;
--Credit policy factors;
--Financial factors;
--Manpower factors;
--A statistical monitoring system for the EGP;
--A guidance and control system for the program;
--The social effects and connections of electronification.

The following social programs and positions taken are connected with the EGP:

--The electronification youth program;
--Trade union tasks;
--TOT [National Council of Producer Cooperatives] positions;
--The resolution of the MTESZ [Federation of Technical and Scientific Associations] presidium.

For the sake of our visually oriented readers we tried to summarize the structure of the EGP in a block diagram. MAGYAR ELEKTRONIKA considers it its task to regularly inform its readers about the details of the program, its progress and achievements.

FIGURE CAPTION AND KEY

The Structure of the EGP

Key:

1. Inter-branch subprograms
2. Branch subprograms
3. System of tools and connections
4. Telecommunications
5. Education, training, retraining
6. Informatics in state administration
7. Computer technology, communications and automation R&D, G-1
8. Electronic parts and subassemblies R&D, G-5
9. Manufacturing automation and precision engineering R&D, G-6
10. The OKKFT program
11. Electronification of agriculture R&D
12. Other ministry level R&D
13. Ministry of Industry
14. Ministry of Agriculture and Food
15. Ministry of Construction and Urban Development
16. Ministry of Transportation
17. Ministry of Domestic Trade
18. Ministry of Foreign Trade
19. National Materials and Price Office
20. National Water Affairs Office
21. Hungarian Post Office
22. Ministry of Health
23. Ministry of Culture
24. Ministry of Finance
25. Hungarian National Bank
26. Hungarian Academy of Sciences
27. Council of Ministers Information Office
28. Council of Ministers Council Office
29. National Federation of Artisan Cooperatives
30. National Federation of Cooperatives, and the TOT
31. R&D tasks of the electronics industry
32. CAD systems
33. International cooperation
34. Regulatory preferences
35. Credit policy
36. Financial matters
37. Manpower
38. Statistical monitoring
39. Social effects and programs
40. Guidance and control system
41. Youth program
42. Trade union positions
43. Hungarian Chamber of Commerce
44. MTESZ resolution

8984
CSO: 2502/7

OFFICIAL OF HUNGARIAN COMPUTER INNOVATION CENTER INTERVIEWED

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 pp 97-98

[Interview with Jozsef Drasny, chief of a main department in the Computer Technology Research Institute and Innovation Center, in the "We Have Only One Question" section]

[Text] [Question] The development of computer aided designing systems for printed wiring boards is not a too economical activity--because of the deficient tool background in our country. Why are you dealing so much with this method recently at the SZKI [Computer Technology Research Institute and Innovation Center]?

[Answer] The CAD systems now used in Hungary to design printed wiring circuit boards belong to two basic types. In one a human does the complicated task, designing and drawing the circuit board, and communicating the data to a computer. The computer first checks the data and if it finds everything in order it prepares the design documentation for the printed circuit board. The result of the human designing work reaches the computer in the form of several tens of thousand bits of data, so the probability of error or mistake increases quite a bit.

Unfortunately the other method is not entirely perfect either. With it the designing is entrusted to the computer, only the starting data are communicated to it. But the computer--especially if it is not a large one--has difficulty with complicated, large scale designing data, it hangs up and asks the human for help. At such times the unavoidable data exchange involves new error sources, if we enter the data from a keyboard in alphanumeric form.

The most favorable designing method is a sort of "golden mean" where the machine does the lengthy computations and the human can intervene at every more important step. This requires tools which create a natural link between man and machine. In this case this means that drawings could be communicated to the computer and we could see the course of the designing in drawings and finally get the result as a drawing.

For example, a digitizing table is a tool suitable for creating such a link; it interprets messages sent in drawings for the computer. One also needs a color display which aids the designing work by constantly displaying the

drawings. For a long time there have been experiments in Hungary to produce such tools. For the time being we cannot get ones which fit personal computers which are smaller in power and price.

This fact has caused our institute a problem from several viewpoints. We have not been able to solve a number of institute tasks in a truly economical way, although it is in our interest to produce products which can be sold at a profit. And there can be profit only with a suitable instrument background.

Under these circumstances there was a mutual meeting with a small Western firm which manufactures graphic displays for IBM PC's. But they did not have a designing method for this system. We signed an agreement to develop a modern printed circuit designing program system for the machines of the Western firm. We felt that this deal would be advantageous for both sides. Our partner will become more competitive by being able to sell his machines together with the programs and we will get tools with which we can solve our tasks at a higher level, and our development costs will be returned--in foreign exchange.

We have now introduced into institutional development the graphic designing work station called the Elektro-CAD System. What does this system consist of? As I mentioned already it consists of a color graphics raster monitor, a digitizing table and a 712 K byte Proper 16/W personal computer--compatible with the IBM PC--to which one can connect a 10 Mbyte Winchester disk. The system works with the Elektro-CAD software developed by us. Every necessary function of modern, two-dimensional color graphics is made available to the designer while controlling at the logical level the connection of the design elements used (parts, connections, metalled holes) during designing. An extensive catalog system aids designing; from it one can call repeatedly used design elements and solutions, parts and typical card designs at any time.

It is a considerable advantage that the designing work can be abandoned at any time and continued later without information loss. The plans can be reworked and modified. One can write out or draw out the results at any stage of designing. This is a natural form of the course of designing where the expert sees the current work process in the drawing, can communicate his ideas in a drawing and can get the final result in a drawing.

We are using the Elektro-CAD system to design our own computers, or more precisely the printed circuit boards being made for them. These boards are most complex, generally have four layers, crowded leads and several thousand connection points. We could check them with screening tests but we consider it expedient to check every single card precisely. We purchased an automatic testing machine for this; in a few tenths of a second it tests even the most complicated layout printed circuit board. Our designing system also provides data to the testing machine so it is built into the CAD chain outstandingly.

The next--automatable--step is mounting the parts, one we had much trouble with before. Parts with flexible and fragile pins must be placed in the holes; only very expensive equipment (which is not too reliable anyway) is suitable for mechanization of such a delicate task; and acquisition of this equipment exceeds the possibilities of our institute. Fortunately new types of parts have appeared on the electronics market recently. These are surface mountable

and have no flexible pins. This is only one of their advantages. The other is that they are very small in size. Parts like this can be mounted only automatically. So the next link in the technological chain will be this sort of equipment, and the computer of the graphic designing system will provide the data to control it.

The services of such a complicated equipment chain exceed the needs of our institute. This is why we are planning to lease out our free capacity in the future--instead of "building it in" into our prices.

8984
CSO: 2502/7

INTERVIEW WITH CHIEF ENGINEER OF HUNGARIAN DATAPLAN COOPERATIVE

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 p 98

[Interview with Peter Banki, chief engineer of the Dataplan Computer Technology Small Cooperative, in the "We Have Only One Question" section]

[Text] [Question] Given the restricted investment possibilities how does your cooperative help the users of computer technology with its activity?

[Answer] Our small cooperative was formed in May 1983 with 17 people. The formation of it was inspired significantly by the fact that users with large R10 and R11 computer inventories needed very high quality services in the interest of carrying out their tasks. In addition we felt that the need for computer applications was increasing sharply, while the investment possibilities were becoming restricted. Better, more economical use of existing tools was coming to the fore.

Because of the above we set ourselves the goal of renewing and speeding up existing systems already in operation, expanding their capacities by using their hardware and software products and extending the life expectancy of computer technology systems by 5-8 years.

Eighty percent of the personnel of our cooperative have higher education training and 10-15 years of professional experience. Our life up to now has been characterized by very dynamic development in both the economic and technical areas. By the end of 1983 we had tripled the sales receipts and profit planned when we were formed; these increased 2.5 times in 1984 and 1985, while our personnel increased to 30 people. At the same time our capacity and the possibilities of the small cooperative economic form are not nearly fully exploited, because of economic and structural problems and difficulties outside of us. Naturally simple maintenance and service activity was not enough for such dynamic development; we also started developments requiring serious intellectual and material investment.

We got our ideas by circulating among computer users, seeing their problems, the weak points, their needs. We began independent developments some of which found a great response very quickly. One of these is the semiconductor operational memory which significantly increases the life expectancy and utility of the R-10 computer; it doubles the operational memory which can be

used to run programs and is more reliable than the ferrite memory. We have sold a nice number of these on the domestic market and a good number already operate in the Soviet Union too.

Another of our products bringing a nice success we got into at the request of one of our partners; this was the development of a highly reliable and fast electronic store. This is a parallel data traffic peripheral built of semiconductor memories which can be expanded modularly and which operating systems handle like a disk store. We have already connected it to CM4, R10 and R11 computers. Our users use it successfully; depending on their tasks it increases the capacity of their systems two to five times without necessitating modification of software they have been using for a long time.

We designed and developed our modular microprocessor development system for quick solution of control, process control and data collection tasks. We realized our microprocessor development system on the basis of orders. On the basis of orders, for example, we realized microscope control and data collection with preprocessing of data, as well as automatic reception of signals from a meteorological satellite, and recording of the received data for further processing.

Without orders we started software and hardware development of a microcomputer "Secretarial Information and Text Processing System" which we considered marketable in Hungary and in the socialist countries.

In the course of our business and market work we often meet with needs and interesting technical tasks in the interest of solving which we gladly and effectively cooperate with experts, enterprises and small cooperatives more experienced in the given theme.

Unfortunately our work also is influenced disadvantageously by the parts acquisition and supply problems afflicting the manufacturers of finished electronic products, and by the obsolescence and capacity shortage of background industry technologies.

Because of the operating conditions our small cooperative can rely exclusively on its own strength; its present and future depend on efficient development, manufacturing and market work. We are planning our operations for a long time, proof of which is that we designed and built a developmental laboratory with a base area of 1,100 square meters where we intend to provide optimal conditions for our operations.

8984
CSO: 2502/7

MICROELECTRONICS, COMMUNICATIONS, COMPUTER DISPLAYS AT BUDAPEST

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 pp 102-105

[Article by Bela Laczko: "The Budapest International Fair 1986." The following is the complete text of the "fair summary"; five introductory paragraphs are ommitted.]

[Text] Parts Manufacture

The MEV (Microelectronics Enterprise)
The plant of the MEV which manufactures integrated circuit elements (chips) was seriously damaged by fire at the time of the fair. It was the largest electronics industry investment of the Sixth 5-Year Plan.

"BOAK" [Equipment Oriented Circuits] is the MEV trademark name for its user designed (custom) circuits. The types developed thus far are NMOS, CMOS (Si gate) and bipolar nets, including a linear array. The U400 EBM, an 8 bit parallel multiplier designed on the U400 base circuit, is already used by several enterprises. There is also vigorous development in the area of surface mountable parts. Parts can be ordered in SOD-80, SOT-23, SOT-89, SOT-143 and So-8...28 capsule types. Special, highly complex hybrid circuits are also designed and manufactured in small series.

The Communications Engineering Cooperative
The cooperative, which manufactures professional TV equipment (monitors, cameras, closed-circuit networks), has established its own microelectronics plant. For the time being they import the CMOS ULA base wafers and process metalled wafers in the plant. The purpose of establishing the plant was primarily to modernize the equipment they make themselves, but they will also design and manufacture circuits on order. They can deliver sample circuits in 12-24 weeks from the beginning of designing; series manufacture requires the same amount of time. They deliver circuits in 22-48 pin ceramic capsules or in 22-40 pin synthetic capsules.

The Remix Radio Technology Enterprise
The new hybrid circuit manufacturing plant is also suitable for large series manufacture. They undertake product development and manufacture on the basis of commissions. At present their large series products include electronic ignition units for Ikarusz autobuses and Lada passenger cars. The plant

undertakes not only surface mounting of hybrid circuits but also the seating of printed circuit parts.

Passive parts are the traditional products of Remix. Outstanding for their quality are the metal layer resistors (R 534) made on the basis of a Siemens license and the polystyrene (C 2441, C 2442), polypropylene (C 2341, C 2342) and polyester (C 2332, C 2333, C 2334) capacitors. They have also begun manufacture of a series of surface mountable R 550 resistors.

The MICOOP Instrument Industry Cooperative
The cooperative manufactures relays in ever growing quantities. The single contact switch M-06, M-13, M-26 and M-55 types which can be soldered into printed circuit boards have an operating voltage less than 9.5 V, 6-8 A nominal current load and a long life expectancy. They have developed testing equipment for a 100 percent check of the final product; in addition to grading it is also suitable for computerized data collection and preparation of statistics.

Kontakta
This enterprise does a large part of the Hungarian electromechanical parts manufacture. New investments started on the basis of license purchase within the framework of the EKFP [Central Electronics Development Program] are intended to solve the chronic parts shortage. Thus far on this basis they have realized manufacture of multiple pole connections and various types of switches. Their newest product--a miniature switch family--is also made on the basis of a license (Siemens Albis). The switches, meeting the 19 mm (3/4 inch) standard which can be built into printed circuits, are made in color versions. The switched state is indicated by yellow, red and green LED's.

Computer Technology
As we mentioned in the introduction the Hungarian computer technology branch is the most dynamically developing branch in electronics. This can be shown not so much by quantitative indexes as by the multiplicity of the developments. Many smaller enterprises (or cooperatives) in addition to Videoton, which leads in manufacture, are developing successfully and manufacturing in smaller series. It is virtually impossible to give a full picture of all these (we would have to list several hundred smaller firms or undertakings) so we will outline the outstanding achievements.

The Computer Technology Factory of the Videoton Electronics Enterprise
The annual gross production of the enterprise is about 15 billion forints of which 6.3 billion is the computer technology share. Annual growth is 10-15 percent, with decreasing prices. The factory embraces the spectrum from personal computers to the minicomputer category.

The TV-Computer is a new product which promises to be very successful; it is outstanding for its cheap price (about 12,000 forints), great reliability and series size (10,000 are being produced this year). It is intended primarily as a school computer for general schools but the price is attractive for private individuals too. There promises to be a great competition on the domestic market between the TV-Computer and the already popular PRIMO personal computer of SZTAKI-COSY.

The VT-16 is a machine in the IBM PC category which is not a new development. What counts as new in it is a local network which can be operated efficiently by the newly developed VT-32.

The VT-32 is a 16/32 bit computer with large background storage (see issue No 1, 1986, of MAGYAR ELEKTRONIKA) which is suitable for operating local networks or developing graphic engineering work stations. It has a UNIX compatible operating system.

The R 11 minicomputer is the smallest member of the ESZR [uniform computer technology system] family and it is being constantly further developed. Videoton exports large numbers of the machine, which is popular in CEMA countries.

Interest in peripherals will be ever stronger, so development and manufacture will be too. So far Videoton has been the domestic manufacturer and exporter of intelligent terminals; it is strengthening development in the area of printers too. Outstanding among the new developments are a laser printer (No 2, 1986, MAGYAR ELEKTRONIKA) which will be very useful as a peripheral for large computers and a small matrix printer which can be a cheap peripheral for small machines. (The price of the latter is 22,000 forints which can be met by smaller institutions and schools.)

The SZKI (Computer Technology Coordination Institute and Innovation Center)
This institute, strong in both hardware and software development, is increasingly growing into an enterprise form. Their enterprising spirit and strong development are the basis for their competitiveness. They developed the first 16 bit microcomputer on the basis of which they also made new, completely IBM compatible versions.

At the Budapest International Fair they introduced the PROPER 16/32 MT which has suitable IBM compatibility and several M bytes of central memory. They introduced the PRONET local network made up of the earlier PROPER 16/A/W/m machines. They are developing page reading equipment and a printed circuit designing system (MAGYAR ELEKTRONIKA, No 3, 1986).

The Instrument Technology Cooperative
This cooperative broke into the market with great developmental impetus. It is able to sell its software and hardware products not only on the domestic market and for socialist export but also for capitalist export.

Their Multicenter-Turbo multi-user, multi-task computer is capable of data concentration and is being made for capitalist export.

They have other significant developments too--the Transmic-8, a portable professional personal computer, the MXT and MAT, completely IBM PC XT (or AT) compatible microcomputers, and the EASTSTAR high performance IBM compatible computer for a maximum of 16 terminals.

The KFKI (Central Physics Research Institute of the Hungarian Academy of Sciences)
The computer development traditions are fairly old at the KFKI. Development of the TPA-11 family began about 10 years ago and since then they have been making more and more minicomputers in small series. The TPA-11/440 won the grand prize last year and this year they introduced the 11/420 as a modernized version of the 440. The TPA-11/540 was a great sensation; it is a 32 bit machine with a VMS bus. The central memory is 5 M bytes, it has a 26 byte address range and virtual memory management. These machines are outstandingly suitable for building CAD systems requiring the megamini category; the KFKI's own circuit designing system--the AULA--presently runs on the 11/420.

The KFKI developed the MSX magnetic tape unit which the Iklad Instrument Factory is already manufacturing.

The SZTAKI (Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences)
The SZTAKI is a significant center in Hungary for applied computer technology research and development. The research institute, turning more and more toward industrial developments, undertakes to solve the more practical tasks and tries to hand on its developments to industry as soon as possible.

One of their significant product families is the graphic terminals. After the TEKEMU and TEXPRO the PHAROS is a terminal meeting the newest BKS standards. It is characterized by raster display, 30 Hz, high resolution (1024 x 1024).

The LAOCON (Local Area Optimized Control Network) also brought significant international success; it was shown at the fair by SZTAKI-COSY. This distributed intelligence control system operates without a central (host) computer with a two wire connection. The modular system makes it possible to install some of the modules in the system being controlled (see MAGYAR ELEKTRONIKA, No 2, 1986).

The DATACOOP
This 30 person small cooperative leads in the development of computer technology peripherals. The DCD-PRT-80 GS is a graphic matrix printer which can be used in many ways. Depending on character size it has a speed of 80/130 characters per second and weighs only 11 kilograms. The BHG [Beloiannisz Communications Engineering Factory] will manufacture this model in large series.

The DCD-PRT-42 Babyprint small printer is a new development which won great success at the fair. It has virtues similar to large printers but weighs only 3.4 kilograms. Both printers are shipped with a head they make themselves and an interface developed to order.

There is a great shortage in Hungary of good quality but cheap keyboards. The DCD-OT-327 keyboard developed by the DATACOOP operates on a new principle--infra red matrix scanning. (When the key is pressed the path of the light is interrupted and this is sensed by microprocessor controlled electronics.) The extraordinarily simple mechanics gurantees high reliability (10^8 strokes).

Thanks to an optionally programmable character generator the desired code can be selected according to user need.

The Telephone Factory

The Telephone Factory is active in an area closely linked to computer technology, remote data processing. Its newest teledata processing terminal won the Budapest International Fair prize. They have an entire family of matrix printers, the TMT-120 family, which they continue to develop. Together with Videoton and DATACOOP they are the most significant printer manufacturers, so there is rather strong competition in this area which hopefully will shortly lead to a radical reduction in prices.

Measurement Technology

The Electronic Measuring Instruments Factory (EMG)

In our issue No 6, 1985, page 38, we described the automatic measurement devices development program of the factory and the model 19400 automatic measurement device for assembled printed circuits (in circuit tester). This system, which was developed jointly by the EMG and the MIKI Measurement Technology Development Enterprise, was one of the products displayed at the 1985 Budapest International Fair. The success was crowned by the grand prize at this year's fair. The progress of the program is indicated by the fact that one could also see from the other side of the program outline introduced earlier the EMG-19700 to test digital LSI, VLSI integrated circuits. We do not believe that one could overestimate, from the viewpoint of instrument manufacturers, the appearance of equipment to automate parts checking for the takeover of foreign goods.

The Labor Instrument Industry Works (Labor MIM)

This enterprise, known for its laboratory testing and auxiliary equipment, introduced many new products. These included a number of analytical tools which we had not seen thus far on the market of domestically produced products--a chromatographic measuring instrument (Chrompres 25) and its complements, such as the Liquopump controllable microfeeder.

An old gap is filled by the ELISA photometer, which could have success among cultivators of modern enzyme measurement techniques. The laboratory and educational robot family is also something new; this could free laboratory experts of monotonous and dangerous operations in analytical laboratories and the precision chemical industry. The arms have an effective range of 4-500 mm and 5-6 degrees of freedom. The robots can be programmed by analytical or teaching methods; in the latter case the teaching can be controlled by a control stick. The control program system can be run on personal computers sold in our country. The program is also capable of processing signals from external sensors and in the case of analytical program preparation it does the necessary coordinate transformations and maintains the position of the grasper during movements.

The MIKI Measurement Technology Development Enterprise

The MIKI showed a broad profile of activity at the fair. It undertakes to develop many types of measurement units, instruments and systems from code transmitters and measurement transformers through facility protection systems

to microcomputer process control systems, primarily in the area of industrial measurement technology. Their system operating at the Northern Hungary Regional Waterworks won a fair prize.

The central, system peripheral interface, data transmission, process interface, auxiliary and expansion modules of the M80 modular system (about 40 units) help to put together systems meeting one's requirements. Naturally all this has extensive engineering and software support.

The MIKI is participating in the development of automatic measurement systems too, as the EMG project shows.

Their digital speech storage and sound reproduction units are suitable for storage of 10-60 seconds of text and playing it back as required.

The Hungarian Optical Works (MOM)
We saw a long awaited device at the MOM stand--the MW-1000 model 130 mm (5 1/4 inch) micro-Winchester store, as the first member of a store family. The unformatted capacity of the standard size store is 12 M bytes on three direct drive disks with 205 bands per side. The transmission speed is 5 M bits per second, median band finding time is 76 ms, or 50 ms with buffered stepping. The linear write speed is 348 bit/mm with a band density of 20 bands/mm. After a sample series of 200 units they hope to manufacture several hundred units in 1987, and then an increasing amount at a fast pace. "There are still many open questions," said commercial director Otto Tobak. They also want to get on the market by 1987 with a new floppy disk store. The MF 6400 DSZ is a two side, half height, direct drive unit. The theoretical capacity of the 2 x 77 bands is 800 K bytes with FM coding, 1,600 K bytes with double density MFM, M^2FM, group coding. They trust and we trust that the manufacturing and service experiences with the "predecessor," the MF 2000, have been built into the new design.

The Communications Engineering Materials Factory (HAGY)
It is possible that the reader is asking, Why is the HAGY in this group? The factory in Vac is the Hungarian manufacturer of ferrite parts. Looking over the products displayed the editor of MAGYAR ELEKTRONIKA asked a similar question of Laszlo Varga, chief of the sales department. At the stand we found, in addition to the traditional products, stabilized power units, the PROMEGEUSZ-256 EPROM programmer and emulator, the PULSATRON therapy device producing a magnetic field pulsating at a low frequency and electronic gas igniters.

We received a logical answer to our question. The reason for the diversification is that a number of our talented professional colleagues live in Vac, since they are needed in ferrite development and manufacture. Although Budapest is not far away, still it is better to save the hours of travel. Well, magnetism, as a physical phenomenon, hides a number of practical applications so that innovative work results in products bringing greater profit. If the HAGY provides the best in Sr-Fe and other truly modern ferrites then we are sincerely happy about the new undertakings.

The Precision Engineering Enterprise

Every year this enterprise exhibits a few high performance, outstandingly useful devices in the course of developing microwave telecommunications equipment and providing testing and service.

The small size TR-5284 model universal counter can be used in the 2 Hz-1.2 GHz range to measure frequency, frequency ratio and averaged cycle time. The sensitivity of the direct input can be varied continuously so determining the correct frequency is possible even in the case of combined wave forms. Its great sensitivity (variable in subranges of 20-50 mV_{eff}) makes possible measurement of local oscillators and RF carrier frequencies without galvanic connection.

The TR 5285 model 2 Hz-10 GHz range microwave counter spans the very broad frequency range with three inputs (2 Hz-60 MHz, 60 MHz-1.2 GHz, 16 Hz-10 GHz). The requirements of microwave technology obviously dictated the development of the several ranges and of the other parameters of the inputs. The reason this device is not suitable for artificial satellite TV technology is simple--building in the requirements for this would have made the device too expensive. Earth microwave telecommunications itself merits such a device.

Notes

A year ago we wrote about three interesting chemical-analytical instruments. The editors were curious about their fate.

Concerning the Infrapid 61 of the Labor MIM we learned that 150 had been manufactured in 1985 for the Soviet Union and 50 for other countries. The plan for this year is again for a series of 200 units.

Medicor made ten of its Nefelometers, what might be called a small prototype series, and intends to repeat this this year at the factory level.

We also again saw the Spectrocolorimeter of the OMSZOV. After positive test results a series of 50 units is now being manufactured.

8984
CSO: 2502/7

REPORT ON HUNGARIAN AUTOMATION CONFERENCE

Budapest MAGYAR ELEKTRONIKA in Hungarian No 4, 1986 pp 105-106

[Article by Istvan Morocz: "Report on the Automation '86 Conference"]

[Text] The Measurement Technology and Automation Scientific Association and the Szabolcs-Szatmar County Organization of the MTESZ [Federation of Technical and Scientific Associations]--in cooperation with a number of other scientific associations and societies--held the Automation '86 Conference and Exhibit between 15 and 17 April 1986 in Nyiregyhaza.

The goal of the conference was to survey, on the basis of an accounting of recent years,
--the role and achievements of automation in realizing national economic goals,
--the newest achievements and use possibilities of technical development--especially automation--in the areas of theory and practical application, and
--factors helping and hindering development,
and to make proposals--not bindingly--in the interest of a further acceleration of the development of automation at the national economic level.

The conference provided a broad forum for the some 200 domestic participants.

The three plenary speeches, the 54 papers (25 in poster format) read in seven sections and the three roundtable talks made it possible for one interested to become informed about current achievements and problems, to sense the role and significance of electronics and computer technology in the development of the methods and tools of automation and to become acquainted to no negligible degree with the boundary area technical-economic problems and the prospects for progress.

Parallel with the conference a very well organized exhibit at the Nyiregyhaza Agricultural College permitted a view of the results achieved in agricultural automation.

The possibility of visiting four plants (the BEAG [Budapest Electroacoustics Factory], Taurus, the Canning Factory and the Paper Factory) was intended primarily to show the level of industrial automation in the county. Because of the crowded nature of the conference program only a small fraction of the

participants took part in the two hour plant visits scheduled for the two days. (Many of us were sorry that we could not take advantage of this possibility; perhaps the organizers can provide another occasion to make up for what we missed.)

The conference was supplemented by film showings before the two afternoon roundtable discussions, one on enterprise information and planning systems and one on robots and their applications. We could see very modern industrial and enterprise automation principles, tools, equipment and applications, primarily at the European level.

Concerning the Essential Work of the Conference
The messages of the three plenary speeches significantly influenced the level and mood of the conference. All three talks gave a proper overview of the themes indicated in the titles; the domestic possibilities and problems were presented in their proper light and closely linked to the professional and economic boundary areas. Let us review briefly the content of the plenary speeches.

I. Dr Andor Frigyes, faculty leading university professor, Process Control Faculty, Budapest Technical University: "Robots--A New Challenge in the Area of Automation"

Automation--at both the international and domestic level--has received a number of challenges in the past 30 years, the successful "subduing" of each of which gave significant impetus to theoretical work in both development and applications. In our present age space research represents one of the greatest technical challenges; the results of this and the formulation of the new technical principles are relayed to us and made everyday matters by robot technology.

Guidance strategy and tactics for robot technology have been compiled; with these the solution of problems can be comprehensively followed and planned. Some of the theoretical questions arising were solved even earlier, but we find an ample number of chapters far from opened or only just beginning to be researched.

Here are a few of them:
--optimal nominal trajectory design,
--multivariable time variant system design,
--fast arithmetics,
--intelligent sensors (for three dimensions too),
--artificial intelligence (form recognition, stresssing the essence),
--the relationship of a robot and its environs,
--the cooperation of manufacturing systems, etc.

Working out these theoretical and research chapters and putting them into practice will contribute crucially to making robot technology an everyday thing.

Here are a few other thoughts from the discussion:
--in regard to the full spectrum of robot technology the tasks awaiting research, development and applications experts are greater than the tasks of space research;
--there is a need to develop a new way of thinking about automation if our progress is to be effective;
--under our domestic circumstances the primary goal is to raise the production level of the economy and of industry with robotics.

II. Dr Tibor Toth, director of the Agricultural Business Organization and Computer Technology Joint Enterprise: "Computer Technology and Automation in Hungarian Agriculture"

Since 1970 production in agriculture has had an industrial character and the flow of information has been traditional. Production has reached the world level in a number of branches. Agriculture needs computer technology and automation solutions.

Regarding the computer technology level of ariculture one can say that it has gone beyond the initial period of a great breakthrough and is living through an age of greater or smaller childhood diseases.

About 2,000 computers have gotten into the blood circulation of the economy, these are of 108 types, but 2-3 types would be enough. There are few programs, the service network is bad, the machines are expensive. We find computer centers in only five places. Microcomputer systems represent the best tool.

The developmental phases of computer culture which can be distinguished in agriculture between 1978 and 1990 are the following:
1. Business mechanization, introduction of business programs;
2. Adapting economic analysis programs, optimizing production processes;
3. Realizing broad automation and computerization (this phase is just starting). This will involve the realization of large and widely used programs such as breeding, automated animal raising, greenhouse automation, etc.
4. The development of complete enterprise information systems (the outlines of this phase are beginning to develop).

The speaker then outlined the conditions for development in detail.

The expected expansion of automation depends on "only" a few things:
--the availability of cheap and reliable equipment (at present it takes 12 years to make one's money back),
--a good service network.

The practice which can be expected in connection with computerization is:
--The economic units will not buy primarily machines but rather information systems;
--Acquiring one's own machine is a better investment than shared processing systems;
--There must be a reduction in computer prices--to about 150,000 forints for a PC and about 3 million forints for a computer center;

--The characteristics of the programs should be: very flexible, they should really "learn" agriculture, they can be used by large groups of operations;
--Agriculture is seeking computer technology.

III. Laszlo Pal, OMFB [National Technical Development Committee]: "Technical Development Policy and Automation"

Technical development is receiving significant support in connection with the nine OKKFT [National Medium-Range Research and Development Plan] programs running till the end of the Seventh 5-Year Plan; within this the G1, G5 and G6 ministry level programs affect electronification and automation.

The role of technical development is significant within the CEMA Complex Development Program; this has reached the policy level and the structure transforming effect of it will be felt within this 5-year plan.

Successful implementation of the electronification program is one of the most important goals of the government. Its significance is shown by the fact that some of the economic regulators are tuned to the program. It is essential to develop a system of social conditions fitted to this. Within this a problem awaiting solution is realization of informatics and automation education in all three spheres of education (lower, middle and upper) in accordance with their significance.

The speaker supplemented his analytical presentation with proposals:
--Creating within the MATE [Measurement Technology and Automation Scientific Association] a work group for leaders and economists which will deal with the spread of automation;
--Extending automation to the leadership of enterprises;
--Comprehensive electronification, computerization and automation of agriculture;
--Increasing the degree of automation in the service spheres.

We cannot, for lack of space, report on the section papers and roundtable discussions at the conference.

A publication summarizing the papers came out before the conference. It is available to anyone. The journal MERES ES AUTOMATIKA will--probably--publish detailed material on the plenary speeches and roundtable discussions.

8984
CSO: 2502/7

END